

POPULAR Computing WEEKLY

**The Amiga
versus
Atari ST
Which will
succeed?
see page 14**

**DMP4000 printer:
Amstrad's latest**

**Building your own
Spectrum keyboard**

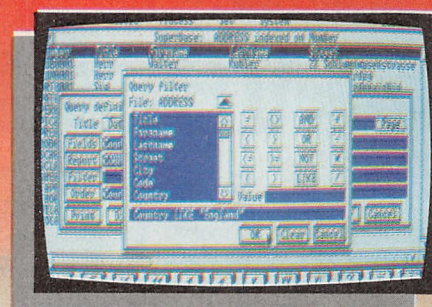
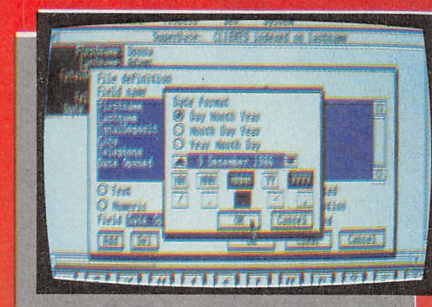
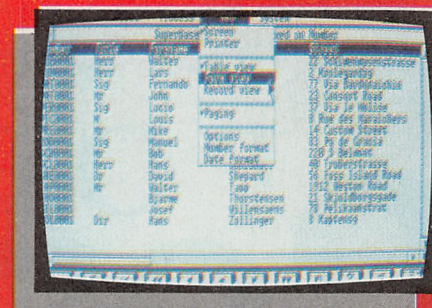
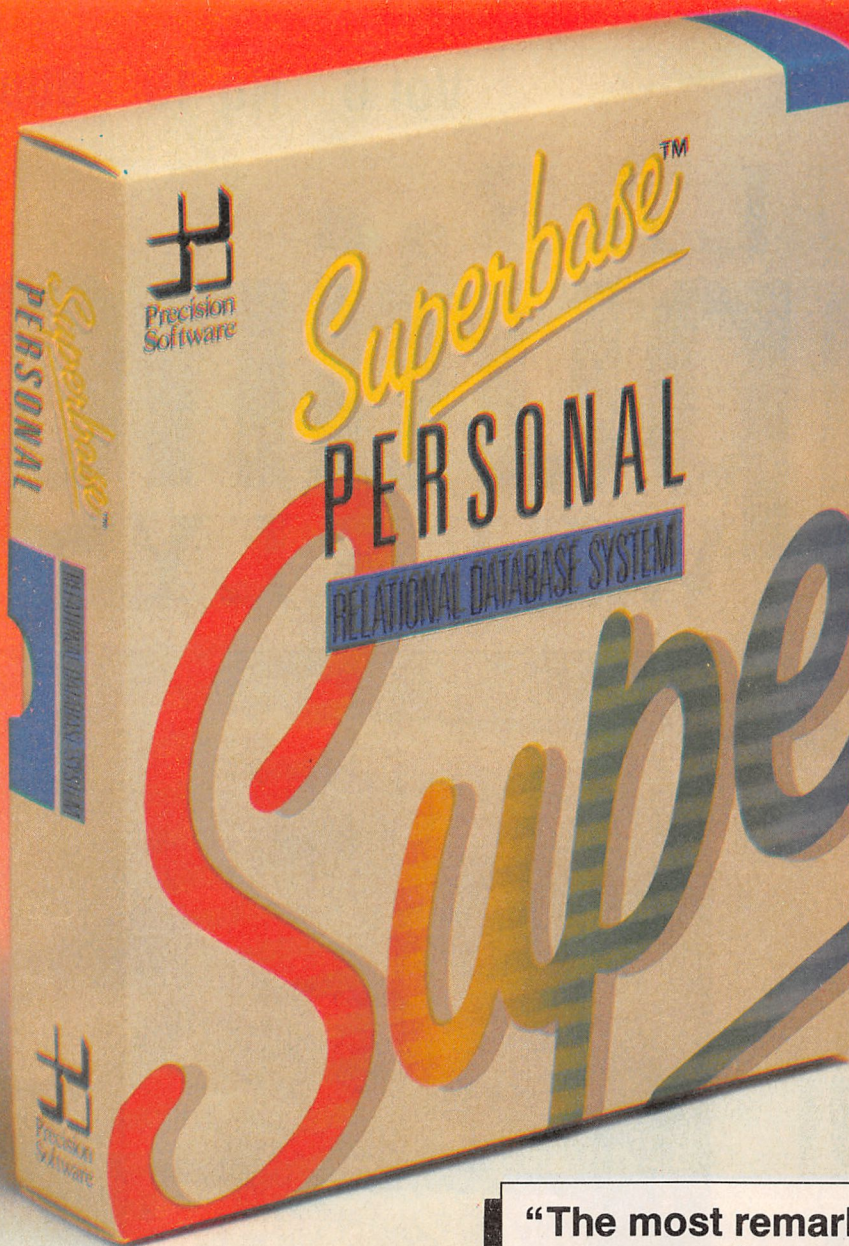
PCW utilities

Music from Microdeal



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**“The most remarkable combination of power
and ease of use on the database front”.**

Karl Dallas, Computer News, March 1987

EASE OF USE

Convenient pull-down menus • Fast, simple file set-up • Familiar tape recorder
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Straightforward exchange of data with other programs (Wordstar™ etc.) • Superb
printout and labels facilities.

POWER

“Excellent indexing and selection facilities” *Dr Kathy Lang, PCW, Jan 1987* • Multiple
file handling for advanced applications • Sort files in combined ascending/
descending order • Huge capacities: 16 million records per file – unlimited fields
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UNIQUE VISUAL DATABASE

“What makes Superbase really unusual is that it allows you to co-ordinate the
storage of records and pictures” *Dr Kathy Lang, PCW, Jan 1987* • Link word pro-
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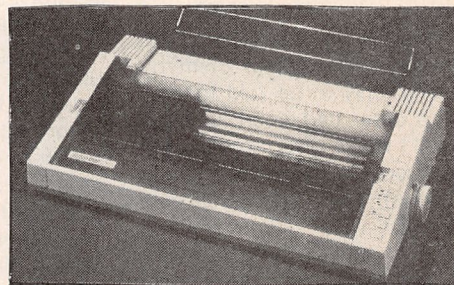


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POPULAR
Computing
WEEKLY

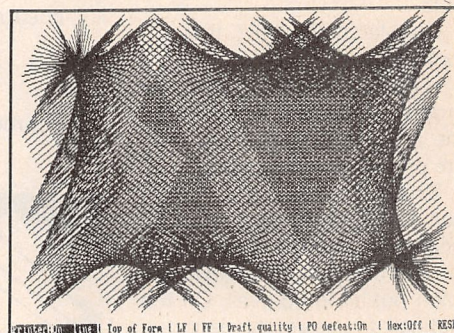
News

- 6 News Desk** *Star Trek* hit by pirates.
- 14 News Analysis** The swords are drawn in the Atari ST versus Amiga 500 battle with the latter due to be launched next month. We assess each machine's chances.
- 39 Soundcheck** This week Mark Jenkins continues looking at Microdeal's range and uncovers the inexpensive *Super Conductor*.
- 40 Communications** David Wallin brings you a mixed bag of networking news.



Features

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- 16 All You Ever Wanted to Know about Graphics . . .** Utilities and routines for the PCW 8256 from CP Software.
- 18 Amstrad DMP4000 printer** Tony Kendle tries out Amstrad's latest foray into the printer market. The DMP4000 has been promoted for use with the PC1512, but is compatible with any computer with a standard Centronics printer port.
- 21 Load It** This device claims to eradicate any loading problems with Commodore's C2N dedicated datasette. Chris Jenkins puts it to the test.
- 22 Alternative Spectrum keyboards** Anthony Reid tells you how you can fit a new keyboard to your Spectrum or Spectrum Plus. No more problems with rubber keys or the plastic variety falling out!



Top: Amstrad's DMP4000 printer.
Above: Screen from All you Ever Wanted to Know . . . Below: Hall of Fame entrant Hydrofool

Programming

- 25 Listings** Programs for you to type in this week include a set of printer utilities for Amstrad CPCs, the first part of a multi-function machine code utility program for the Commodore 64, the conclusion of Magic Maze on the BBC, and for the ST, a routine to condense your screen files.
- 33 Bytes and Pieces** Short routines for you to type in.
- 35 Learning C** Our series on learning to use the programming language C continues with part three.
- 37 Peek and Poke** Kenn Garroch answers your programming queries.

Games

- 48 New releases** Your complete guide to all the games released this week, including Hewson's latest, *Eagles*, and, from SSI/US Gold, *Roadwars*.
- 49 Hall of Fame** New from FTL is *Hydrofool*, the follow up to *Sweevo's World*, and a worthy member of *Popular's* Hall of Fame.



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Popular Computing Weekly. Tel: 01-437 4343.

Trouble with Maros

In response to an advertisement by Maros Computers of Longton, Stoke-on-Trent and published in *Popular Computing Weekly* December 11 1986, I sent the company an order for two games cassettes for my Amstrad, total value £8.50.

After three weeks with no delivery, I contacted them by phone, only to be told that no such order had been received but if I would give them the PO numbers they would check their account. Again the result was negative.

I then notified the GPO in the forlorn hope that they could trace the missing order and POs.

On March 25 1987 they informed me:

"I can confirm that the postal orders in question were paid to the account of Maros Computers on December 22 1986."

Since receiving this confirmation, I have contacted Maros by phone on another three occasions in an effort to obtain reparation but all to no avail. On the last call, the assistant manageress, who answered each call, promised to return my money but that was almost three weeks ago and I feel very badly let down by Maros.

I have since confirmed all this in a letter to Maros and requesting that they return my money within 14 days.

I'm not very optimistic about the outcome but wonder if any other readers have had any problems with them for, as a regular reader, I've noticed their advertisement in quite a few issues.

John McSwayde
Aberdeen

Memotech performance

Well done G Payne (Letters, April 3) for pointing out the speed of the Memotech MTX series. However, the real advantage of the Memotech over its rivals is the fact it has a powerful built-in Z80 assembler, disassembler and monitor which interfaces with Dasic. I am sure the IBM basic doesn't include such power.

How about a review of the new Memotech MTX 512 Series 2 computer? Basically, this is an enhanced MTX 512 with 256K Ram, which can be accessed from Basic. It has a greater graphic specification than the Commodore 64, with 32 hard-

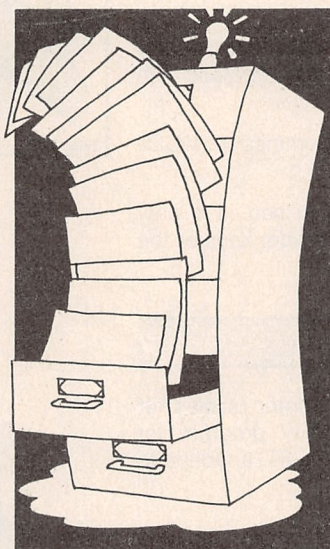
ware sprites, 16 colour and dedicated I/O mapped graphic controller, three channel sound, powerful built-in text language called Noddy, Basic, assembler, and monitor.

It also has joystick, RS232 (optional twin port expansion), Centronics printer, TV monitor, Rom expansion (up to 2mh), networking ports, black aluminium metal casing, and 79 keys, including function/numeric and editor pad.

Which other 8-bit machine boasts such a specification for only £100 and with a proven track record for quality and reliability? My MTX 512 is on its third year. It can be easily upgraded to full CP/M compatibility, cheaply.

A F Wilson
Whitehaven, Cumbria

We scarcely need that review now.



Not so sophisticated

I would like to correct W Murray, *Popular* April 17-30, when he says the Atari 800 is the most sophisticated 8-bit micro on the market.

Mr Murray, I have news for you. MSX2 beats the Atari 800, in fact it has superior graphics and sound than the Atari 520ST, although it is not as fast. Okay, the UK sales of MSX2 aren't as good as the Atari, but there are loads of MSX1 users in the UK that can 'upgrade' to MSX2 without having to scrap any of their existing software or peripherals (Atari 8-bit users will find they have to scrap all their existing software to upgrade to the 16-bit machines). MSX is also the world's "best selling system".

Mr Murray points out that the

800XL can display 256 colours simultaneously on the screen using a suitable machine code routine. With MSX2 this is possible from Basic, and you can choose from a palette of 512 colours.

Talking of Basic, the Basic on all the Atari micros is totally useless. Take MSX Basic for example: to play a short tune all you need to type is PLAY"ABC" and that would play the notes ABC. What could be easier? A similar Graphics macro language is also used.

I am not sure about the memory expansion of the Atari, but MSX2 can expand to 6 MegaBytes, and, yes, you can use it all from Basic, and yes, it is an 8-bit micro. Future generations of MSX will offer compatibility with the current generations, a very sensible marketing ploy on the part of the various manufacturers, I don't worry about my computer been defunct tomorrow, I know that any future generations of MSX will all work with the programs I have for my current micro.

David Haslett
Preston

Not quite ideal

Re Ideal(?) Computer Show over the weekend of May 2-3.

I have been to many computer shows but the pathetic effort on this show by the sponsors to (a) get exhibitors (b) get punters shows the failure to advertise for both. Your magazine was the only one which it seemed to have any mention of the show.

The venue is not well known, and the admission price was exorbitant, although at least the Guide was not too expensive. But when I got there just about 1pm on Saturday several stands were closing and considering not to arrive for the Sunday.

J A Groves
Wallington, Surrey

An image problem

On April 13, I wrote to the MD of CRL, the software company, as I have not received my copy of *The Image System*, as per your special offer in *Popular*, March 6. I am writing to you to ask if there is anything you can do to help. After all, the original incentive to order the program was because of the coupons you published giving a £5 price reduction, so there must be

some responsibility devolving on your magazine.

Please do what you can, would you? If only to save me having to go further in the matter.

R C Medford
Sale, Cheshire

CRL's managing director, Clement Chambers, tells us that there was a problem with stocks of *The Image System*, which has now been sorted out. According to Chambers, you should have your copy of the program by the time you read this.

Looking for some music

I am currently looking for computer software which has an application in music and I would be obliged if you would let me have any information on articles, etc, published in your magazine in the last three years.

J S Carnell
Redhill, Surrey

Popular has been covering musical applications for micros in general every week in Mark Jenkins' Soundcheck column since June 5, 1986. In that issue, we also carried a 12 page music supplement.

Further supplements on music appeared in the issue dated October 2, 1986, and most recently, Popular, April 3, 1987.

Without knowing which micro you have, or what specifically you wish to do in the field of music, it is difficult to point you towards particular editions. Popular does not run a reprint service, but back numbers are available from Annmarie O'Dwyer on 01-437 4343.

Those good old days

Many thanks for the look back in time in your fifth birthday edition, and many happy returns.

I am one of your readers who not only remembers the first issue, but actually bought one. The old 'newspaper' style made *Popular* stand out from the rest.

I can remember the days when you could buy a computer for £45 plus a long 28 day wait and then had to get the soldering iron out to build your ZX81! I still have mine and it still works!

I was one of the first people to buy a Lynx 96K computer. I still have it. It was an extremely

good machine and good value for money in its time. It was a great shame when they ceased trading.

Over the last five years quite a lot has changed, but quite a lot is still very much the same, ie, Sinclair still keeps his customers waiting; there are new computers still coming on the market; programming standards have improved considerably.

I look forward to your 10th birthday when there will be a great deal more to remember.

K Martin
Cinderford, Gloucs

CDS address

Could you give me the address of CDS, the company which published *Steve Davis Snooker*? If not, can you tell me where I can get hold of it?

Jason Hedge
Dagenham

Certainly. CDS is at CDS House, Beckett Road, Doncaster DN2 4AD. The telephone number is 0302 21134.

Where is the PiMan?

Just a quick word to tell you that I am disgusted! As a regular reader of *Popular* (almost) from the start, I looked with some interest at your Datalines section in the May 1 birthday issue. And did I find what I was looking for? No!

Not one mention of the brilliant PiMan comic strip, for so long a regular advertisement on the back page of the magazine. So why wasn't it mentioned?

Iain Tatch
London E4

Consider the omission rectified.

Icon toolkit supplied

I will supply Icon Toolkit (Amstrad CPC) listed in *Popular*, April 17-May 8, on tape or disc for £3.00 and £5.50 respectively. Also included is an example program Memo Pad and full documentation. The address is: Simon Goodwin, 41 Fountains Drive, Acklam, Middlesbrough, Cleveland TS5 7LW.

Simon Goodwin

An interesting idea (but misleading)

Geoffrey Wearmouth's benchmark for recursion (Letters, May 1) is an interesting idea, but the figure given for the



BBC B ignores the fact that procedures should be used for recursion on this machine. On acorn machines (BBC B, Electron, Master, etc) benchmark A can be re-written as:

```
10 CLS:A=-1
20 DEFPROCprint
30 A=A+1
40 PRINT TAB(1,1);A;
50 PROCprint
```

The result on a 32K BBC B, in Mode 7, is now 2160 compared to the original 14; by shortening the name of PROCprint this can be raised to 2161.

Jonathan Temple
Nottingham

The Atari debate again

I was very interested in the letter from Pierre Chenier, printed in *Popular*, March 6.

Firstly, I certainly agree with

his comments about the Atari XE/XL monitor option.

This is a straightforward composite video/sound input, and I use mine with a Commodore 1901 monitor with very good results (joining the 'lum' and 'chrom' inputs together of course).

I also agree that the colours and ease of graphic use is better on the Atari 8-bit, though I definitely don't think that player missile graphics give as good results as the Commodore sprites, mainly due to their size.

However, he is definitely barking up the wrong tree with his comments on the sound capabilities of the two machines. The C64 is far superior in this department, and that's all there is to it.

The C64 can produce three waveform types, unlike the Atari, which has only one. Also, pitch control is rather less than perfect on the XE/XL range.

Mr Chenier mentioned *Dropzone* as being better on the Atari, and I agree with this. However, try *Ghostchaser*, *Quasimodo*, *Boulderdash* or *One Man and His Droid*. Any trained musician would be sickened by the music on the Atari versions. Only the tone deaf need apply here!

Tape loading is another weakness on the XE/XL range. It is slow and very unreliable, with no indication of what is going on.

The Commodore 64 is slow, but tape routines can be modified in software. On the Atari a hardware modification is required, which may not work with protected tapes.

The same applies to the disc drive speed - hardware rather than software modification which sometimes fails with commercial software.

I just thought I'd put the other side of the C64/Atari 8-bit argument. I own both machines, so I have got some idea about both of them.

C R Elsdon
Attleborough, Norfolk.

We're sorry but *Popular Computing Weekly* cannot guarantee to reply to all letters requesting a personal answer. It helps us enormously if readers are prepared to have general queries answered on these pages, so, if possible, please do not send SAEs.

Kicking the black queen again

Back to Game One of the *Colossus* chess tournament this week where the Readers, playing black, have voted to move their rook to the open e-file. *Colossus* has responded by moving its bishop to f3, kicking the black queen again.

How would you get your queen out of trouble this time? Send your suggested move to either Inter-Mediate (*Popular Chess*), Freepost, Sawbridgeworth, Herts CM21 9YA (no stamp needed), or *Popular Chess*, Unit 2, The Maltings, Sawbridgeworth, Herts CM21 0PG (with a stamp). All entries must reach either address by Wednesday, May 20.

Prizes

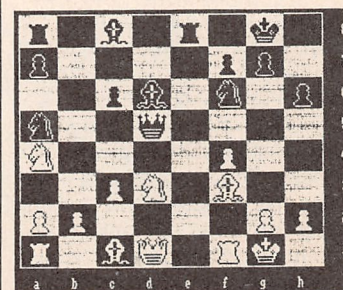
A British Museum reproduction Arran chess set will go to the person suggesting the most accepted moves at the end of the game. Five copies of *Colossus Chess 4* will go to the most consistent entrants.

Next week, we return to Game Two, where the Readers are playing white.

Game One

The moves so far:

- | | |
|-----------------|--------------|
| 1 Pe2-e4 | Pc7-c5 |
| 2 Ng1-f3 | Nb8-c6 |
| 3 Bf1-c4 | Ng8-f6 |
| 4 Nf3-g5 | Pd7-d5 |
| 5 Pe4xd5 | Nc6-a5 |
| 6 Bc4-b5+ | Pc7-c6 |
| 7 Pd5xc6 | Pb7xc6 |
| 8 Bb5-e2 | Ph7-h6 |
| 9 Ng5-f3 | Pe5-e4 |
| 10 Nf3-e5 | Bf8-d6 |
| 11 Pd2-d4 | Pe4-d3 |
| | (en passant) |
| 12 Ne5xd3 | Qd8-c7 |
| 13 Nb1-c3 | Ke8-g8 o-o |
| 14 Pf2-f4 | Qc7-b6 |
| 15 Nc3-a4 | Qb6-d4 |
| 16 Pc2-c3 | Qd4-d5 |
| 17 Ke1-g1 (o-o) | Rf8-e8 |
| 18 Be2-f3 | ? |



Summer PC1512 deal

AMSTRAD has announced a £150 discount on a bundled package with the twin-floppy, mono monitor PC1512.

In a bid to beat the usual downturn in sales during the Summer, the "Amstrad Office" package will be available for the

three months from June 1 to August 31.

The bundle features the PC1512, DMP3000 dot matrix printer, *Wordstar 1512* and *SuperCalc*, at a total price of £822.35 including VAT. Usual price is £998.82 including VAT.

An Amstrad spokesman denied that the promotion would be extended to other machines in the range, or that it would continue past August 31. However, 'summer special' computer offers in the past have frequently become permanent.

Pirates prevent Star Trek shipping

THE release date of *Star Trek* has been held up again, as publisher Beyond discovered the existence of pirated copies of an unfinished version of the game.

The pirate copies are apparently available both in this country and in Europe, although it is not clear whether they have originated from Europe or the US. Beyond is working on the title in close collaboration with both software house Simon and Schuster and the film company Paramount in the US.

Representatives from Beyond were unavailable for comment, but it is presumed that the finished game will not go on sale until the existence of illegal copies has been investigated.

Ideal show fiasco

ANGRY exhibitors at the recent Ideal Microcomputer Show couldn't get away quickly enough.

Organisers Ramco International Exhibitions had given attendance estimates of 20,000 prior to the show at the Kensington exhibition centre, held over May Day weekend.

But only a few hundred people are understood to have attended the two-day event.

Many exhibitors, including retailers Gultronics and Sir Clive

Sinclair's Cambridge Computer, decided to leave the show early.

"There were no crowds there, so we had to pack up on the first day," said a Gultronics spokesman. When the Gultronics team tried to leave, the organisers refused to let them.

"At first they refused altogether, but after having a chat with the management, they agreed. We're having a meeting with some other exhibitors to decide what action to take," he

went on.

It is understood that some exhibitors feel they have been misled by the organisers over attendance estimates. Some people are understood to be refusing to pay booking fees as a result of the affair.

But Sir Clive Sinclair was philosophical. He dismissed the show as "just one of those things".

Ramco International Exhibitions could not be contacted at the time of going to press.

Psion peripherals double

PSION is extending the software available for its *Organiser* hand-held computer with a spreadsheet, and a communications package.

Comms Link, the communications product, gives improved facilities over the original RS232 Link. It will connect the *Organiser* to any computer, printer or modem with an RS232 port, for down- and uploading of data.

It can also be used as a file server with IBM PC and compatible machines - included in the package is PC file handling software on disc.

The spreadsheet can manipulate data in a 26 column by 99 row format - two rows being shown on the *Organiser's* screen at any one time.

Forty-five financial and scientific functions are available with *Pocket Spreadsheet*, and it can also be programmed by the user on OPL (*Organiser Programming Language*). It is also compatible with Lotus 123.



Managing director Dr David Potter affirmed that Psion plans further software for the *Organiser* in a number of areas, including games. He also stressed that the *Organiser* was

a long term project, and stated that further versions of the machine would be introduced.

Further details are available from Psion at Psion House, Harcourt Street, London NW1.

MORE NEWS ON 10-13

Apology

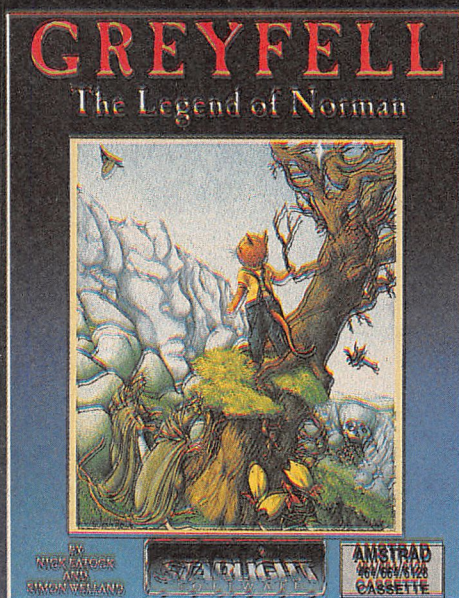
We forgot to give credit for the use of the photographs in News Analysis, in *Popular Computing Weekly*, May 1, headed "Trade war threat: the implications for Europe".

The photographs of US President Ronald Reagan and Treasury Secretary James Baker were published by courtesy of the United States Embassy Information Service, London.

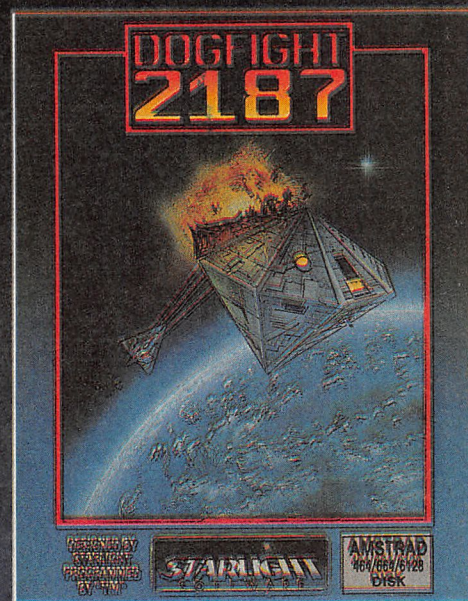
The photograph of Japanese Minister of International Trade and Industry Hajime Tamura was published by courtesy of the Japan Information Centre, London.

STARLIGHT

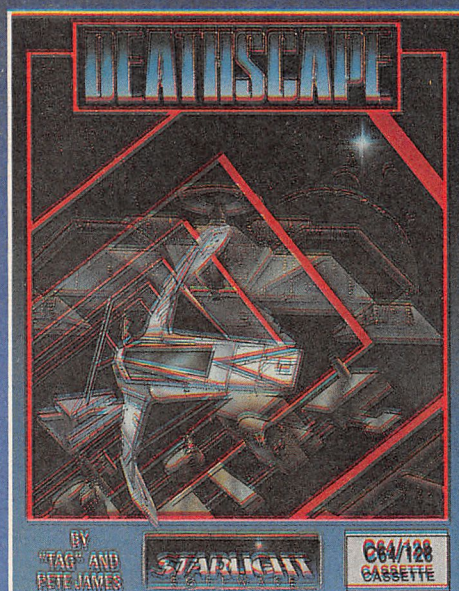
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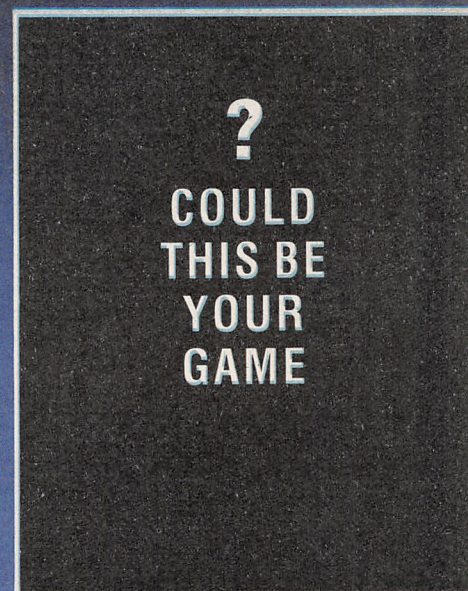
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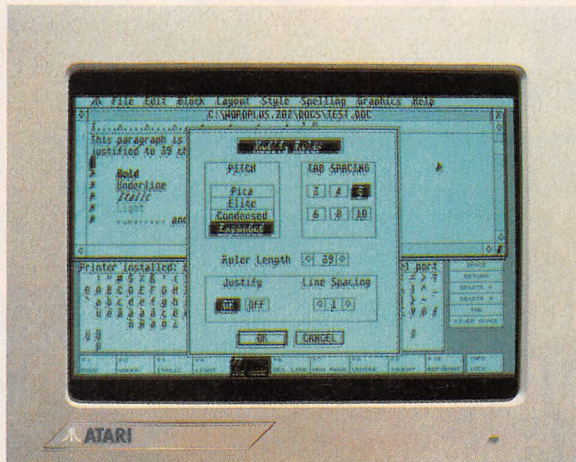


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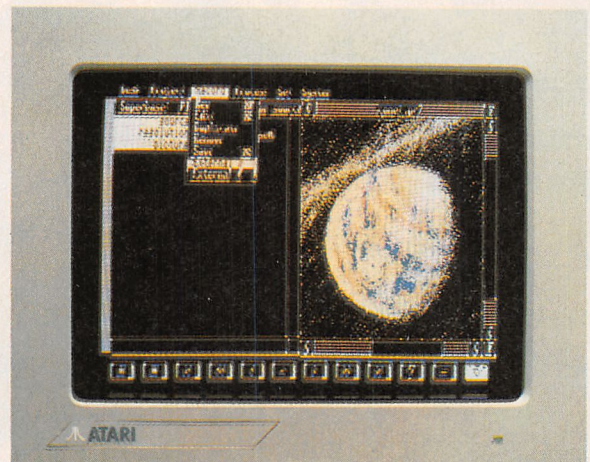


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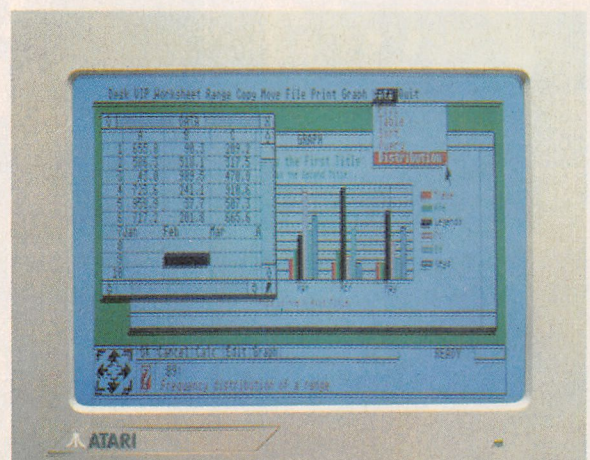
1st Word Plus – G.S.T. Professional word processor featuring U.K. spellings and integration of graphics including 1st Mail for full control of form letters etc.



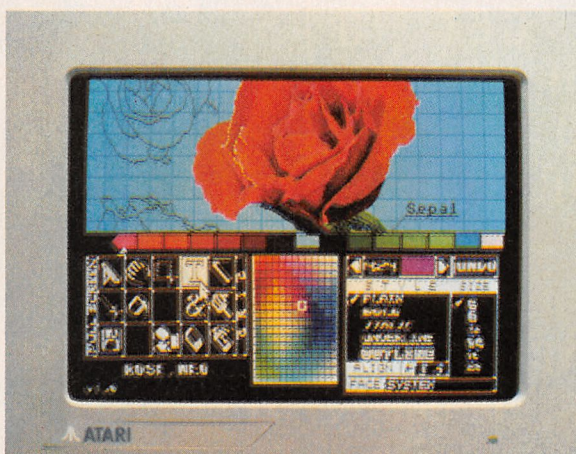
Superbase Personal – Precision Software. All the features of GEM combined with full relational database power. Easy to set up, flexible, plus unique picture index facility.



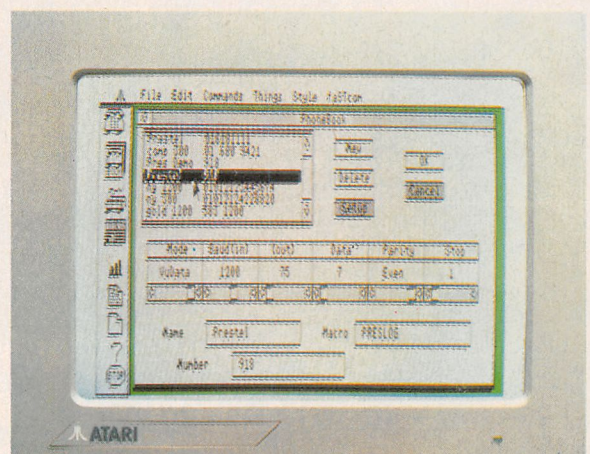
Fleet Street Publisher – Mirrorsoft. The complete desk-top publishing package. Gives you page make-up combining text and graphics for sophisticated, professional looking documents.



VIP GEM – Silica Distribution. VIP Professional is an integrated spreadsheet, database, and graphics package. GEM environment plus Lotus 1-2-3 compatibility.

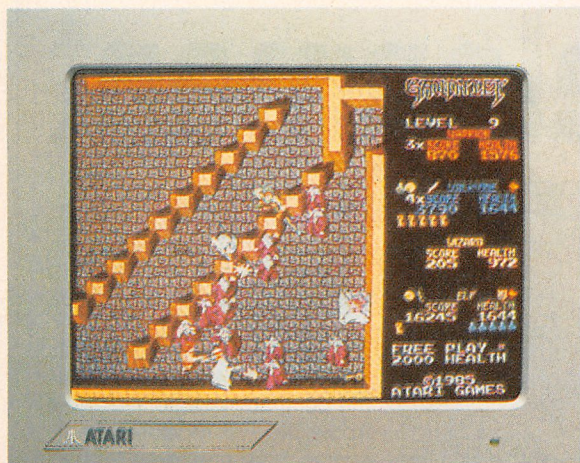


Neochrome – Atari. A powerful, sophisticated painting program for unsurpassed graphics. Work boldly on full screen canvas or in minute detail using Neochrome's magnifier.

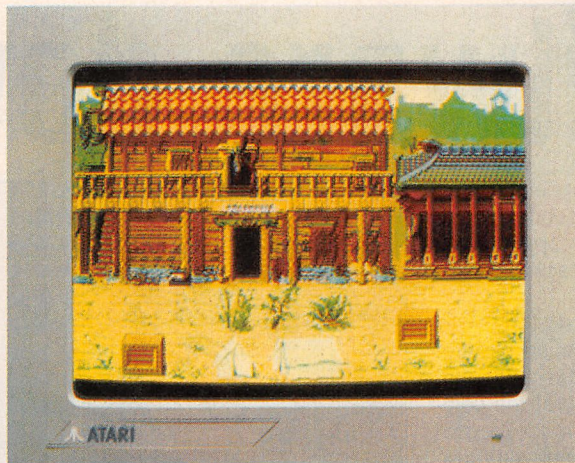


Fastcom – Atari. A professional communications software package giving access to most major databases worldwide. (Integrated ASCII/Viewdata package).

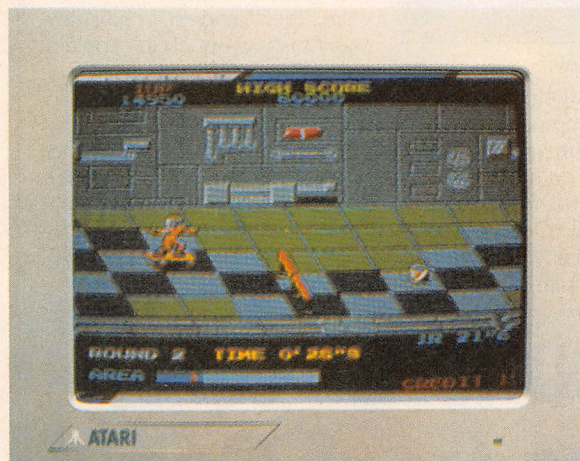
These other fiends may be a bit trickier.



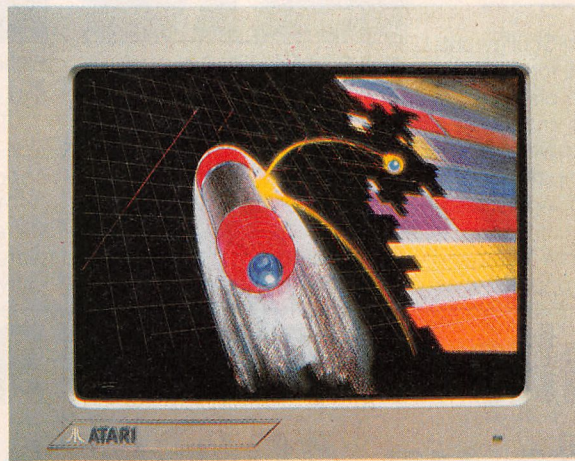
Gauntlet – U.S. Gold. Enter a world of monsters, mazes, mystery and combat in the ultimate role-playing fantasy game.



Tai Pan – Ocean. Voyage to 19th Century Hong Kong for action and excitement with pirates, smuggling and mutiny.



Metrocross – U.S. Gold* It takes lightning reflexes to get past the potholes, obstacles and forbidden zones to reach the other side. And that's just the beginning!



Arkanoid – Imagine* The latest smash-hit coin-op game! Are your reactions quick enough to handle 33 different play screens?

Mixing business with pleasure is no problem with an Atari 520 ST. Not when you've got over 1,000 software titles to choose from.

You'll find all the latest games and a huge range of business titles from the top business software houses. And the range is growing all the time.

You won't be short of power, either. The Atari 520 ST is twice as powerful as most business micros.

So you'll be able to create spectacular colour graphics. Even animate them to make your own films. If you're musically minded, you can compose and play a full symphony.

Or, for those who'd rather write programs than music, the 520 ST supports over thirty programming languages.

In fact, whatever you're looking for in a computer, you'll find it in the Atari 520 ST.



ATARI 520 ST
WORKS HARD · PLAYS HARD

Apple branches out on software development

APPLE has announced the formation of an independent company to develop applications software for the Macintosh and Apple II ranges.

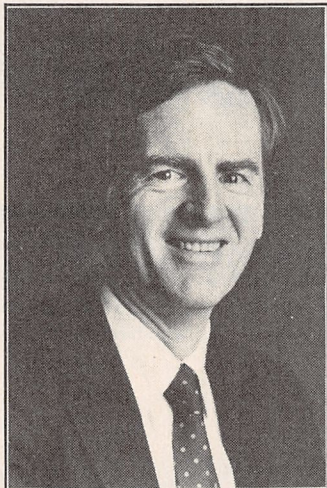
Details are still sketchy – no name or even location has yet been decided for the new outfit.

But it is known that the company will market under its own label applications software currently handled by Apple itself.

The new company will be formed as a wholly-owned Apple subsidiary, and assume independence "within one year", according to the company's announcement.

Apple CEO John Sculley outlined three reasons for the plan: "First, since Apple plans to de-emphasise its logo and label on its applications software, developers can participate in the software market for Apple products on a more equal footing.

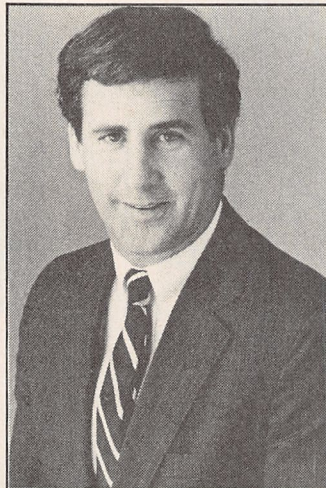
"Second, the new company will increase the opportunities



John Sculley

for third parties to bring important new software applications to the market.

"Right now, there are many small developers working on breakthrough software for Apple products, but they don't have the resources to market



William Campbell

and distribute their products.

"The new company will provide them with a significant opportunity to do so.

"And third, the new company will assure that a full and complete line of quality applications software is available for Apple

products," he said.

President and chief executive officer of the new company will be William Campbell, formerly executive vice-president of US sales and marketing.

Campbell is to begin recruitment immediately, and while the company is a subsidiary of Apple, he will report to Apple senior vice-president Albert Eisenstat.

The move follows the successful launch last March of the Macintosh II and SE. Apple UK boss David Hancock recently said that initial orders for the SE were "the strongest for any new Macintosh product in Apple's history".

● Apple shareholders will be in the money soon. The company has announced a cash dividend of \$0.12 per share and a two for one share split for the quarter ended March 27, 1987. The offer applies to all shareholders registered on May 15, 1987.

Results 1: Atari profits up 400%

ATARI has reported a four-fold increase in income for the first quarter of 1987 over the first three months of last year.

In the quarter ended April 4, income increased by 412 per cent from \$1,831,000 (about £1,097,000) to \$9,365,000 (about £5,600,000).

The company also announced a 54 per cent increase in sales, from \$44,877,000 (about £26,889,000) to \$65,133,000 (about £39,025,000).

Atari's news is the most startling example yet of the current upturn in the microcomputer industry. All major manufacturers had reported drastically reduced rates of growth in recent years.

Worldwide growth for personal computers and related indus-

tries – monitors, software and other accessories – dropped from over 70 per cent per year in 1982 to less than 20 per cent in 1985.

But 1986 saw improvements in general performance, with growth in the industry expected to exceed 20 per cent this year, according to market researchers Infocorp.

The Atari announcement comes at a time when companies such as IBM and Apple have also reported healthy figures.

US analyst Drexel Burnham Lambert sees the company in a strong position, unaffected by last month's IBM announcements and the US-Japan trade dispute, and quite able to compete successfully with Commodore, its main rival.

Results 2: Good news from Gould

COMMODORE's third-quarter results, for the three months ended March 31, 1987, show a net profit of \$1 million (about £595,000).

This compares with a net loss of \$36.7 million (about £21.8 million) for the same period last year.

Turnover was down on last year, from \$182.3 million (about £108.5 million) to \$160.5 million (about £95.5 million).

"Although this quarter's sales reflect a slowdown, particularly in the US, from the high level of the December quarter, we had a very strong performance overseas which accounted for over 70 per cent of total revenues," said Commodore chairman and chief executive officer, Irving Gould.

Gould was a central figure in

the moves three weeks ago in which he replaced former Commodore boss Tom Rattigan (see *Popular Computing Weekly*, May 1), who is now suing Commodore in a \$9 million action.

Gould also sacked fifty staff at the company's West Chester, Pennsylvania, head office. Commenting on the moves, he said:

"Actions have been taken recently to strengthen management and streamline US operations to improve productivity and profitability to complement the achievements of our overseas operations."

Analysts will be watching for next quarter's results carefully – that is when the shipping of the new Amiga machines will take effect.

Robtek 'smash and grab' claim over Diamond

SOFTWARE firm Robtek faces a £½m damages claim over its new Diamond Games label.

The Isleworth-based outfit had recently announced the launch of the new label under the name Diamond Software (see *Popular Computing Weekly*, April 10).

But a bespoke CAD and financial software house based in London claims that it registered the name Diamond Software two years ago. And it's taking legal action against Robtek to prove it.

Popular Computing Weekly contacted Robtek directors in Holland and Belgium, who offered conflicting explanations.

"We haven't registered Diamond Software as a name," said director Paul Share.

"It's all down to some very stupid mistake. We're not called

Diamond Software – we're Diamond Games," said financial director, Robert Zysblat.

Zysblat claimed that one of Robtek's PR team had mistakenly put the offending name on all press and advertising material, and that Diamond Games was intended to be the new label's name all along.

But he then suggested that it was a problem for Diamond Software in any case. He claimed that the name had been registered in Germany since 1972. He further asserted that, under EEC law, this patent could be applied retrospectively in any member country.

"But we're trying to resolve the matter between ourselves," he said.

A source at Diamond Software dismissed Robtek's story as "cock and bull".

F-15 Strike Eagle for CPC and Spectrum

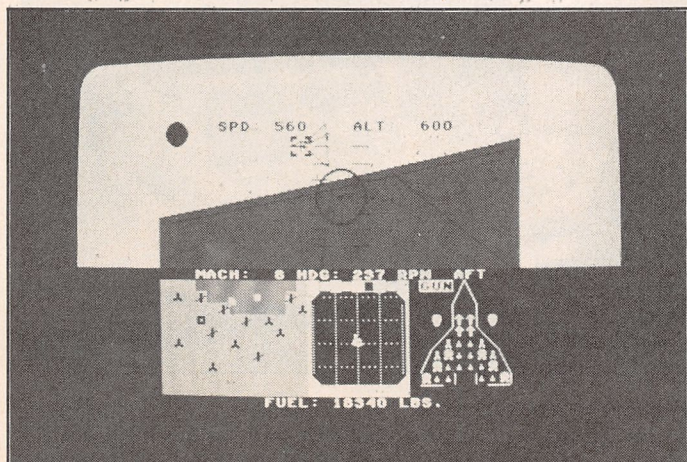
MICROPROSE has announced Amstrad CPC and Spectrum versions of *F-15 Strike Eagle*.

The title features seven different flight missions, from Vietnam to Iran. It was written by Sid Meier and developed by Microprose boss Bill Stealey.

F-15 Strike Eagle is already

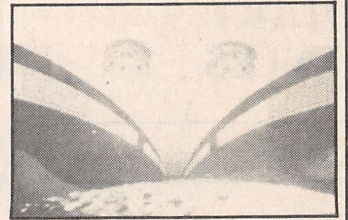
available for the IBM PC, Amstrad PC1512 and compatibles, Atari 8-bit, Commodore C64/128 and Apple/Macintosh machines.

Amstrad CPC versions cost £14.95 (disc) and £9.95 (cassette), while the Spectrum version carries a £9.95 price tag.



F-15 Strike Eagle on the Spectrum

SOFTWARE HOTLINES



After the announcement a few months back of the formation of **Arcadia** – Mastertronic's arcade coin-op arm – the first products are at the play testing stage . . . and they're looking good.

Firstly there's *Rockford*, which has been developed by First Star. Sure, it's *Boulderdash*, but *Boulderdash* like you never saw it before. Faster, brighter and with a few more frilly bits, it's as frighteningly addictive as it ever was.

More interesting from a technical point of view, there's *Road Wars* (see above). Still very much in prototype form, it's a race/blast game to end all race/blast games and with most of the graphics digitised the overall effect is stunning.

The boards inside the coin-ops are modified Amigas with 1½Mb Ram . . . but the plan is to produce home computer versions of all Arcadia products – and with 16 presently under development, it's a case of watch this large space.

News from BT – on Silver, two to watch out for are *ZTB* (on Amstrad) by Paul Shirley of *Spindizzy* fame, and *Zolyx* – a fabby *Quix* variant on Commodore 64. And for anyone waiting for ST *Sentinel*, take my word that it's by far the best version yet.

Down at **Beam Software** in Australia, it must be a good

life. Surfing, sunbathing, cracking the tubes by the dozen and occasionally turning out some decent games.

But what will Tolkien fans think of when they read their *Shadows of Mordor* instruction books and see their hobbit heroes described as 'furry footed little runts'. Nothing like keeping to the spirit of the original, eh?

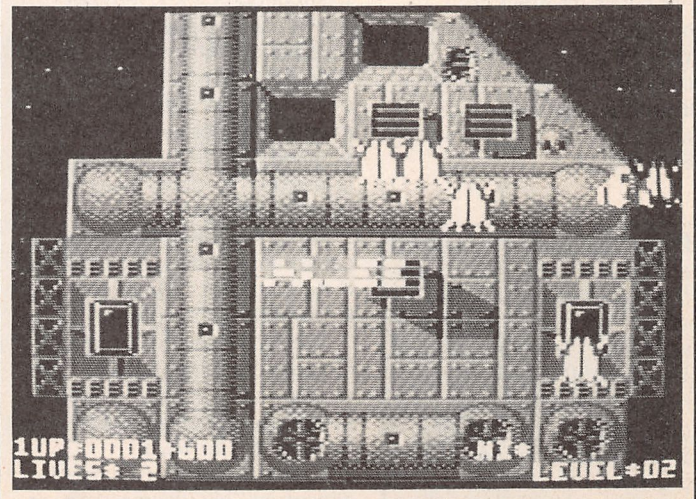
Something's brewing at **Incentive**. After intensive questioning which left him permanently three inches taller, MD Ian Andrew released details of a project that has been in development since last September.

It uses a programming system they're calling *Freescape* which apparently gives you the freedom to go anywhere within a solid landscape and do anything in it. Ian is claiming a breakthrough with the system – and the end result should be appearing on Spectrum, Commodore 64, Amstrad CPC, PC and ST around the time of the PCW show.

Below see a screen shot of **Nexus's** *Hades Nebula*, a vertical scroller – out soon, but the shock news is, no more pencil boxes from them.

Finally, as this is my last Hotlines, I'd just like to thank everyone who's sent in letters of acclamation, congratulations and encouragement. Thanks Mum.

John Cook



DIARY DATES

MAY

30 May

ZX Microfair

New Horticultural Hall, London SW1

Details: Hardware and Software for Spectrum and QL owners

Price: £1.50, £1.00 advance; £2.50, £2.00 on the door

Organiser: Mike Johnston
01-801 9172

JUNE

12-14 June

Commodore Show

Novotel, Hammersmith

Details: First public showing of A500 and A2000 Amigas

Price: £3 adult, £2 children

Organiser: Database Exhibitions,
061-456 2991

30 June-2 July

PC User Show

Olympia, London

Details: Hardware and software for all users of IBM PCs and compatibles

Price: £5

Organiser: EMAP International Exhibitions
01-608 1161

JULY

10-12 July

Amstrad Computer Show

Alexandra Palace Pavilion, London

Details: Displays and demonstrations of all latest hardware, software and peripherals for Amstrad computers

Price: £3 adult, £2 children, £1 discount for advance booking

Organiser: Database Exhibitions,
061-456 8835

Prices, dates and venues of shows can vary, and you are therefore strongly advised to check with the show organiser before attending. *Popular Computing Weekly* cannot accept responsibility for any alterations to show arrangements made by the organiser.

PC/PCW hotline service plan from Dixons

DIXONS has teamed up with the Small Business Support Group to offer a telephone hotline support service for people who buy their Amstrad 1512s and PCWs from Dixons.

Billed as the Dixon Support Contract, the service will offer telephone support from the SBSG's team of business computing experts, and membership to the One-to-One Electronic Mail Service will be included in the £39.99 annual membership fee. Other services include hardware support through Dictaphone, and a training course on the use of the computers.

The offer to join the group will

be extended to all those who purchase Amstrad PC and PCW computers from Dixons, and will be controlled through point-of-sale leafletting. If the buyer chooses to join, the SBSG will send out the membership form and an information package.

Jonathan Hart, Computing Marketing Manager for Dixons says that the company shall "be making every effort to communicate the importance of professional back-up for personal computing" with the offer.

Further information on the Support Contract and other services offered by the SBSG can be found by telephoning the group on 0386-852641.

Mastertronic budget deal

MASTERTRONIC has signed a Europe-wide deal involving US Gold budget label, Americana.

The agreement covers manufacturing, sales, distribution and marketing of about 50 back-catalogue titles.

The deal, described by Mastertronic's Alan Sharam as long-term, is understood to give the firm entry to the fast-expanding budget games market, while giving better support to Americana products.

"Only the beginning of an ongoing co-operation between Mastertronic and ourselves," is how US Gold chief Geoff Brown was quoted as describing the deal last week.

It is understood that most items covered by the deal will be at £2.99, with some £1.99 titles as well. Other US Gold titles may be available through Mastertronic in the near future.

Deluxe anti-glare screen

A NEW hi-tech anti-glare screen has just been released by Kareware. *Screenshield* looks like a roller blind and is attached to the VDU casing above the screen.

The release of this product comes in the wake of a highly critical report on the negative effects of VDUs from the VDU Workers' Rights Campaign. One of the recommendations of the report was that all equipment should come with an anti-glare screen. (See *Popular Computing Weekly*, May 1.)

One of the features of the Kareware filters is a diagonal filter system which should cut down glare considerably, whilst maintaining screen visibility. In addition, the metallised surface is earthed to drain away electrostatic charges.

These have been reported to cause an increase in stress by disturbing the natural ion balance in the atmosphere.

The facility also protects microchip equipment which can be harmed by static build-up in the immediate environment, according to Kareware.

Screenshield is available for almost all microcomputers or



VDU units, and special sizes can be made to order. Prices range from £64 to £87 including VAT.

Further information is available from Kareware (KAI Ltd.), Unit 1, 7 Cubitt Street, London WC1, telephone 01-608 0082.

Amiga vs Atari ST: the fight is on

The launch of the Amiga A500 at next month's Commodore show heralds a head-to-head fight between the Amiga and Atari's 520STFM. Both companies hope the machines will attract 8-bit upgraders. John Brissenden assesses the chances

The Commodore/Atari rivalry will reach fever pitch next month following the public launch of the A500 Amiga.

From June 12, the race will be on between the Commodore and the Atari 520STFM. It will be the first time the UK 68000-based market will have the choice between two such closely matched machines.

So which machine will capture the hearts, minds and disposable income of the great British public? What are the similarities and differences between the two products which will determine the winner? And which will be the best long term buy for people weighing up the two machines?

It's an important question,

since both Commodore and Atari have recently shown their anxiety about future success in their UK operations.

The two companies have been cut-throat rivals since the late seventies, when Jack Tramiel's Commodore beat down Atari, then a subsidiary of Warner Communications, in a US price war.

When Tramiel abruptly left Commodore in early 1984, and subsequently bought out the ailing Atari to start it afresh, there was no doubt which firm would be the intended victim of Tramiel's aggressive strategies: his old company, Commodore.

In any case, the 'new' Atari looks much like the 'old' Commodore. Many of the Tramiel faithfuls, including the current

Atari UK head, Bob Gleadow, joined Atari from Commodore following Tramiel's famous buy-out.

And Commodore has recently undergone a purge of management staff, both in the US and UK, with the sudden departure of Chris Kaday as UK MD, and the ousting of Thomas Rattigan, the US chief executive, in a boardroom battle with chairman Irving Gould.

Now the stage is set. The Amiga may now be outselling the ST in the US, but in the European market, particularly West Germany and Britain, things are much less clear-cut.

decisions are made on such a long-term basis.

At the price level of each machine, the main target buyer is a particular section of the home market.

"Our main target audience will be the upgrade market from existing 64, Spectrum, BBC and Amstrad 464 users who are seeking a greater level of sophistication and facilities than cheap MS-DOS machines can offer," said then Commodore UK boss Chris Kaday at the A500 press launch in March. It is fair to suggest that this is also the positioning behind the Atari STFM.

Given that the two machines are aimed at virtually identical user groups, there are three variables affecting the size of the user base they can hope to attract.

The first is price. This is arguably the most important factor, particularly in the UK market, and it is here that the ST wins hands down.

Recommended list price for the 520STFM is £469.41 including VAT. A monochrome monitor costs £176.47 extra inclusive, although under a current bundling deal it is possible to pick up the two together for £528.23 inclusive.

A bundled 520STFM and high resolution colour monitor can be bought for £822.35 including VAT.

This compares very well with the A500, with a list price of £587.05 including VAT, and a

continued on page 14 ►



The Amiga A500: £587, plus £350 for the monitor. "Targetted at upgraders," says Commodore UK

Wimp systems

The STFM and the A500 are, of course, similar in many ways. Both are based on the Motorola 68000 cpu, both have 512K Ram, both have built-in 3½ inch floppy disc drives. Both are WIMP (Windows, Icons, Mouse and Pull-down Menus) systems.

Both have serial and parallel ports, and both can accept up to two external floppy drives.

The basic differences in the hardware are that the ST's memory can be expanded to 4Mb, as opposed to the A500's 1Mb, and that the ST can accept a 5¼ inch 20Mb hard disc drive.

Both machines are aimed at the same markets. On the one hand, there is the educational market, which is valuable but very difficult to break into in any large way, because purchasing

◀ continued from page 13

mono monitor costing a further £351 inclusive – over £900 for a mono system. Most people would agree that the A500 is indeed overpriced.

The next factor is dealer availability. It is difficult to gain an up-to-date impression of the dealer base for a particular machine, but in September 1985 Atari announced the formation of a new dealer network with 350 outlets for its new range of products.

As for the A500 Amiga, there are as yet unconfirmed reports that it will be available through a large retail chain, in addition to the usual Commodore dealer network.

The crucial issue

But the crucial issue will be software availability. From the outset the A500 will be at a disadvantage in the UK. While both the Atari ST and the Amiga A1000 had the unavoidable problem of no software being available at launch, each had the 'cushion' of an earlier launch in the US. This paved the way for imported software to become available in the UK.

But the Atari ST in the UK has had the advantage of being around for that much longer and many software houses decided it is the 'in thing' to program on. Certainly their programmers think so.

Amiga software has not 'caught on' in the same way, because the A1000's user base – or lack of it – has not justified wholesale conversions or resources being allocated to it.

Most software houses in this country seem to be of the opinion that the prohibitive price of the Amiga, plus the partly established user and software base for the ST, give the Atari a clear run.

US imports

Many UK companies import American entertainment titles for both machines, so the problem of deciding which machine to write new items for is less urgent.

"We are coding every American product in the UK for the Atari ST, therefore we're doing in all about another 15 major coin-ops and licensed products.

We're only doing one Amiga product – *Gauntlet*," says Tim Chaney of US Gold.

"I still personally think that the Amiga is overpriced by the time it gets to the consumer," he adds.

"The Atari is getting a lot more support. Not that it's easier to write for, if anything it's probably less easy than the Commodore.

"But the pricing policy that Atari's got is about right."

Activision's Andrew Wright agrees. The Hampstead-based UK division of the US firm currently has 18 new titles on each machine.

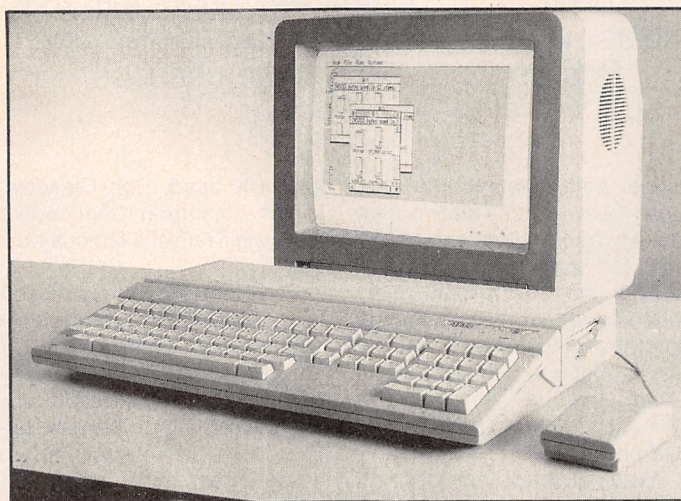
"All our 16-bit software

sensitive to price than the US, Mark Lewis of EOA (the UK division of US firm Electronic Arts) thinks that the price difference could be less of a problem than many observers think – and if that's the case, he thinks the Amiga can win on its own terms.

Behind the Amiga

EOA is firmly behind the Amiga, following the example of its American parent company.

"For the UK, I would agree that the ST is more reasonably priced. It will be interesting to see how many STs are sold in



Atari's 520STFM: the version of the ST range aimed largely at the individual buyer

comes from the States, where the market is a bit different. Over here the ST is obviously more popular than the Amiga.

"Commodore have been doing quite well at shooting themselves in the foot lately and their marketing isn't really there," he says.

In Wright's view, the ST's installed user base puts it way ahead in its appeal to software houses and public alike. And he can see Atari putting the STFM out even cheaper as Christmas approaches.

But things are never that simple. Wright claims to know a number of programmers who have already ditched their STs in favour of writing material for the A500. And that's not all.

The US market has some useful pointers for the future of 68000 machines in this country. It is accepted that most Amiga A500 users will be upgrading from existing systems. And while the UK market is more

the UK – it may move into the low end of the desktop publishing market, who knows?

"But the 500 is an exciting phenomenon, it's the way the future of home computing is going," he goes on.

"In the States, there's no question that people will go for the Amiga. For one thing, the chances are pretty good that they'll already have a colour monitor anyway. And the level of software for the Amiga is larger."

So that's the crux of the matter. If you have a compatible colour monitor already, or if you have the money to buy a high-resolution monitor with a new system, and if you are likely to be using mainly American games software, then the Amiga will probably stand the test in terms of graphics capabilities – and even the price may not be too much of a problem.

But otherwise the ST has it.

NEXT WEEK

Amstrad CPCs and PCWs

SPECIAL supplement

All the latest news of products and developments on the CPC and PCW front.

PCW games – after the initial flurry of games conversions last year, how has the market settled down? Plus the latest CPC games reviewed.

We also look at the increasing range of mice for the PCWs, and test *Dial-Up*, a new communications software package.

Amiga 500 full review

If this week's News Analysis has whetted your appetite for Commodore's redesigned Amiga, check out our detailed review of the machine. The salient differences between the 500 and the original A1000, software availability, the machine's capabilities... all in next week's Popular.

Atari 8-bit wordprocessing

Atari may be marketing its 8-bit range – the XLs and XEs – as games machines these days, but that hasn't stopped Xlent Software from expanding their range of non-games software. Mark Annetts reports on *The first Xlent Word Processor*

Programming in C

Onwards and upwards in C with part four of Kenn Garroch's programming series.

Maxam was the very first release from Arnor – a very good AMSDOS assembler and monitor for the CPC machines that still has its champions some years after its initial release, even though there has been an almost uncountable number of competing programs put on the market.

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0010 Program prog1      SK SIO for command mode      Alt-1 (or Alt-2)
0020 Ch 1      line 1     col 1      No markers set      Insert
0030 PRINT "Program 11"
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0060 RESET      equ $0000
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There are three main parts to the program. The assembler has been expanded from the 'norm' by the provision of a selection of structured programming commands, notably *Repeat-unit if then* and conditional assembly, and commands for controlling the mechanics of the assembly process that can be embedded in the source code. These include *Plen* which sets the page length for printing of the code, and the ability to switch between different output devices and much more. The comprehensiveness of these commands demonstrate that Arnor use their own programs

One of the important aspects of assemblers is that they should be easy and quick to use. This often depends more on the quality of the support programs than the assembler itself. Maxam's editor is superb, not surprisingly as it is a full

Common to all recent Arnor releases are a superb selection of system management commands. Discs can be formatted (data or system format on PCW machines, which is a vast improvement on Amstrad's diskkit), copied, files moved, protected, erased or full file information (start address, length,

[illegible]

I have gone on record many times to complain about the number of assemblers that are being foisted onto the public, but my main gripe is that 99% are simply very average rehashes of existing releases. This isn't true of *Maxam 2*, it is an excellent and extremely powerful package in all respects. Arnor's pricing has begun to frighten me a little – they are obviously going for serious users – but they do make sure it is worth it.

Program Maxam 2 **Micro** Amstrad
CP/M+ **Price** £79.95 **Supplier** Arnor
Ltd, 118 Whiteladies Road, Croydon,
Surrey CR0 2JF.

MORE FOR YOUR PCW

The name may win records as the longest ever for a software program, but *All you Ever...* is a really useful collection of machine code routines as David Wallin discovered.

All you Ever Wanted to Know About Graphics, the Universe and Everything on the PCW 8256/8512 But Were Afraid to Ask is quite a mouthful, and it doesn't even tell you what the program does! Let me endeavour to explain.

The program is a collection of 52 different machine code routines, which can be used to enhance Basic programs. In fact, they work in most languages which allow you to 'poke to' and 'call' machine code addresses.

"The program is a collection of 52 different machine code routines"

To use the routines, you must first put the disc in and type SCODE. After that, you can load up Basic or whatever other language you wish to use and the routines should be available for use. I find that SCODE should only be used when the computer is first switched on. It does tend to crash rather a lot, so I would advise saving a program and removing the disc from the drive before running/executing it. Also, *All you ever...* tends to cause *Write Hand Man*, if you have it, to crash and vice versa.

The disc supplied contains SCODE.COM, which contains the routines, and SCODE.GEN, which is the documented source code for SCODE.COM. This is useful for anyone who wants to use the routines in their own programs. There are also some Basic and machine code demo programs to try out.

The routines perform functions from the clearing of the screen to animating sprites. About 10 to 20 of the routines are 'easy' things to do in Basic anyway, such as; CL5, Home Cursor, Beep, etc, most of which can be performed by printing escape codes (PRINT CHR\$(27)+"character") and are explained in the Amstrad Basic manual.

In Basic, many of the routines can be confusing to use. Whereas in most Basic extensions, like ExBasic, the commands are similar to the current Basic ones, *All you Ever...* uses awkward CALL and POKE commands. This 'lack' of user friendliness gives two features that ExBasic and the like

don't have. Firstly, the routines will work with other languages. And secondly, as you will read below, the routines can be studied by programmers and used in their programs (provided copyright is not infringed).

To give you an idea of what the commands are like, comparing Nabitchi's ExBasic command to clear the screen with *All you Ever's* gives you Exbasic's PRINT "CLS." and *All you Ever's* LET A=49749:CALL A. Both are fairly short, and simple to use, with ExBasic's the easier of the two.

In *All you Ever*, the CLS is one of the shortest and easiest of the routines to use. Now let's take a look at a more complicated one to draw a line;

```
POKE 56186,1
POKE 56187,0
POKE 56188,0
POKE 56189,0
POKE 56190,0
POKE 56191,0
POKE 56192,50
POKE 56193,0
POKE 56194,100
POKE 56195,0
POKE 56196,100
POKE 56197,0
POKE 56198,200
POKE 56199,0
A=49152
CALL A
```

X coordinate
Y coordinate
X coordinate
Y coordinate

That draws one line from (50,100) to (100,200). Those of you who use Basic with GSX patched on, will see that *All you Ever...* is simpler to use: there's no open-

ing or closing of the workstation or anything like that. But then what's not simpler to use than GSXed Basic!

You are told how to do some routines, without the program in memory, in the back of the manual. For example did you know that if you type;

OUT 248,8

the screen will turn off, and;

OUT 248,7

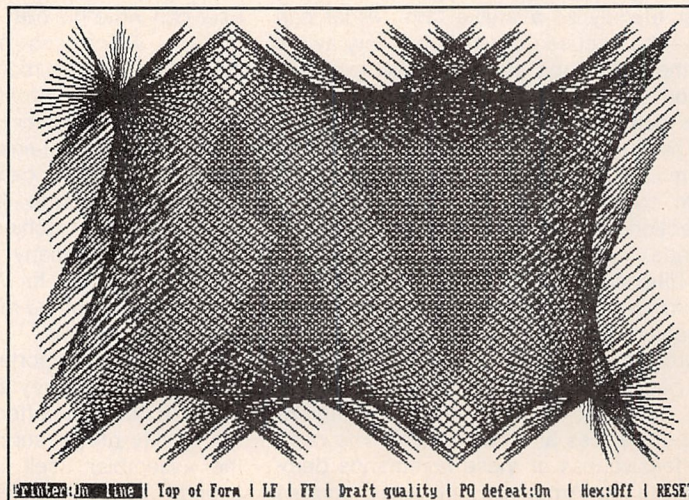
will turn it on again.

The manual is unfortunately not very clear and most of the commands are not described in nearly enough detail. For the technical whizz kid who can already program in machine code, then the manual is really quite good and makes a useful reference book.

Is it worth £19.95? I consider it is. It is cheap for what you get, though I would advise computer novices to stay clear of it for a while as it may put them off for good! But it is certainly the best Basic extension package I have used.

Program *All you Ever Wanted to Know About Graphics, the Universe and Everything on the PCW 8256/8512 But Were Afraid to Ask* **Micro** PCW 8256/8512 **Price** £19.95 **Supplier** CP Software, Stonefield, The Hill, Burford, Oxfordshire OX8 4HX, (099382-3463).

All you Ever Wanted to Know About Graphics: this program makes it easy to create complex looking graphics such as this.



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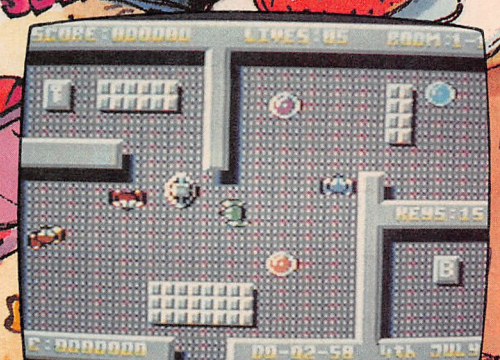
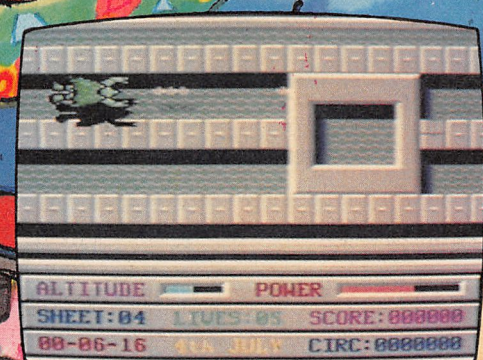
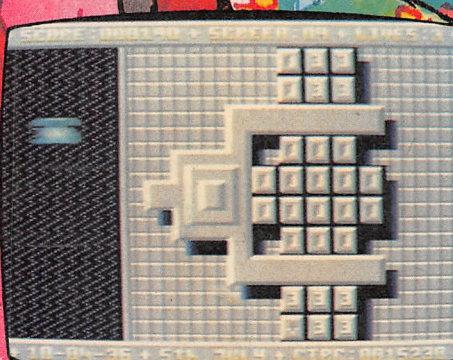
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PRINTS CHARMING

Printers can be noisy, aggravating things to use, but these features don't have to become standard. Amstrad's DMP 4000 proves the point, as Tony Kendle was delighted to discover

The first Amstrad printer released, the DMP-1, was cheap and it did work, but in many ways that was the best that could be said for it.

Designed with a breathtaking disregard for recent advances in the printer industry, the DMP-1 lacked many essential features, most obviously Epson compatibility and a near letter quality print mode, and was rightly critically reviled.

The omission of Epson compatibility was a particularly daft decision. It meant that the printer couldn't be used with a great deal of existing software, particularly those that produced graphic screen dumps, and including quite a lot of Amsoft's own program range.

Even so they were presumably profitable enough to encourage the company that there was a future in printers – the mistakes were rectified with the release of the excellent value DMP 2000 (together with the new numbering system designed to publically distance the machine from its predecessor).

The more recent DMP 3000 was essentially the same machine, with a choice of IBM or Epson compatible modes. When designing its own badged dot matrix machine IBM themselves built upon the Epson standard (did anyone say anything about the pot and the kettle?), albeit with some small modification to the character set offered so that it would reproduce all of the symbols offered by the IBM PC computer. The average user would never notice the difference between the two types except when trying to print something that seemed trivially unimportant to the Americans (such as '£'s). Commercial programs rarely use these extra characters, and almost always provide Epson and IBM printer options together.

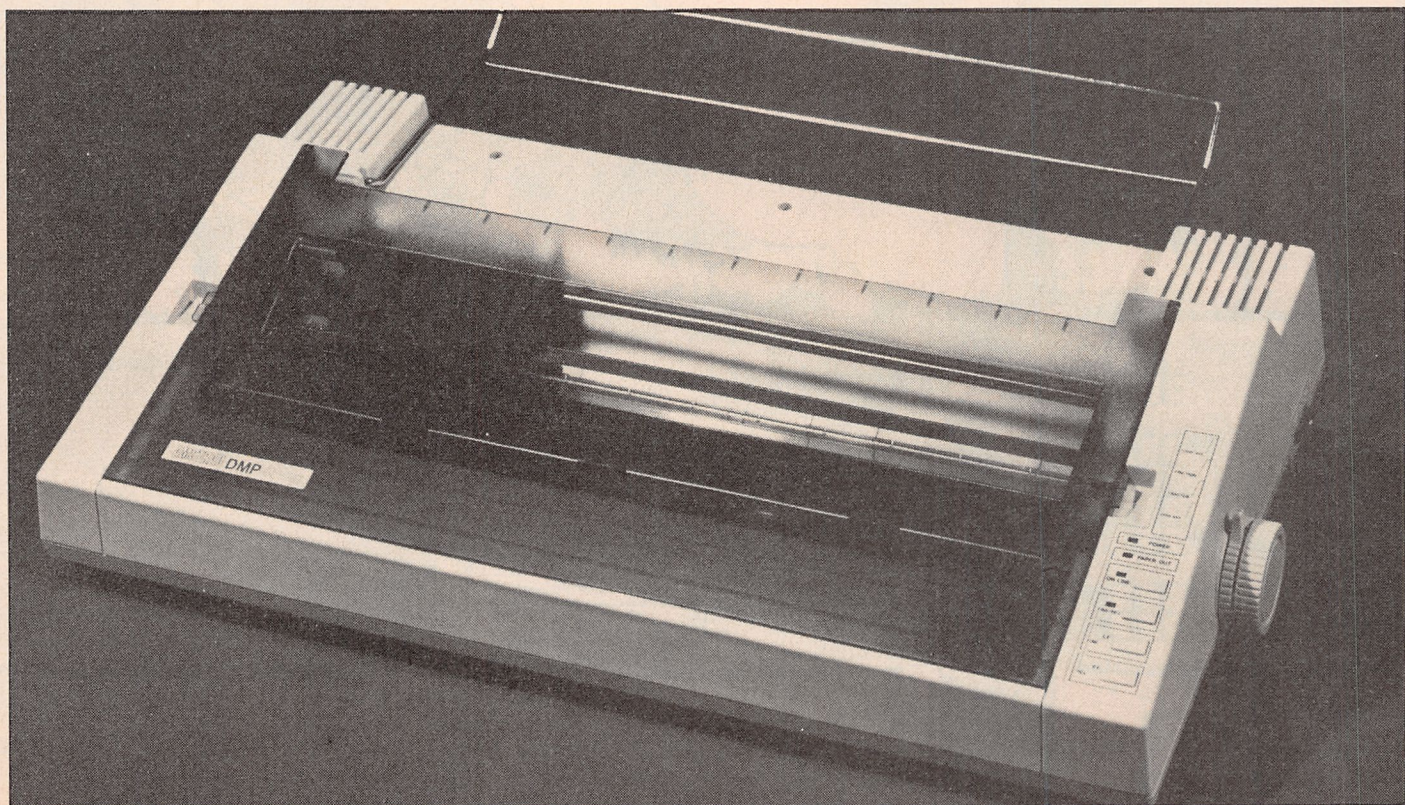
Alan Sugar has now made a public statement of his commitment that Amstrad should become a major force in printer manufacture. The printer industry is ripe for a shake-up, and Amstrad will be just the Company to do it. The DMP 4000 is the first machine to emerge since this promise was

made – so is it good enough to make his intentions credible?

The 4000 is advertised as PC compatible. This does not mean that it can run *Lotus 129* and *Flight Simulator* but it has the same character range as PCs do. It is also Epson FX compatible, and like all DMP machines it will work with *any* computer with a centronics interface.

The most obvious difference from its predecessors is that the 4000 is a wide carriage machine, capable of printing on 3½–15" wide paper which is a maximum of 136 columns of 10cpi printing. The paper feed mechanisms provided are, not surprisingly, the bog standard tractor and friction pair, used for continuous and single paper respectively.

Loading single sheets on the 4000 is possible rather than pleasant, but at least it is not as hideously difficult as with many machines. By clever design, the heads used for pulling the tractor paper also contain two guides which make it much easier to load and straighten the paper.



The DMP 4000: pleasant to use

HARDWARE: REVIEWS

Unfortunately no sheet feeder options are mentioned and even more disappointingly the 4000 does not provide the semi-automatic paper feed option that was a blessing of the PCW printer. This system, whereby once the bail bar is pulled forward the central plate pulls the paper into position, is becoming increasingly common on machines in the £300 plus price range and it is a shame that Amstrad hasn't learnt from its own success.

Regular readers will know of my distrust of infernal tractor feeds that dump the paper out in the ideal position to join up with the paper going in, and causing no end of trouble. The 4000 is better than some, with a special paper separating wire bar add on that for once works reasonably. Using this makes it easy to rig up a system of shelves, pulleys and heavy-weights that ensure that the machine can run unattended, although I still would not dare leave the room for long periods.

Normal Typeface
Underlined
Italic
Elite typeface
Double strike
Bold
Sub and Super Script
Condensed
Enlarged

Double strike elite
and italic double strike elite

High Quality text can be
Proportional
Underlined or
sub and super Script or
Enlarged

The print speed is a remarkable advance. It is advertised as 200 characters per second in draft mode but anyone who has bought printers before will know that all manufacturers either appear to make up their speed ratings, or perform their tests in zero gravity vacuum chambers. This is tolerable because all speed ratings seem to be equally brazenly, so comparisons can still be made.

Speculating about the real performance of the 4000 is therefore pointless as it would make it seem less good than it is: I can say that it is very probably the fastest wide carriage machine you will find at the price. Even the Near Letter Quality mode doesn't slow it down unbearably and it is a huge improvement over all earlier Amstrad printers, both DMP and PCW ranges. Some special foreign and graphic characters are so large that they require a double pass in draft mode, and four passes in NLQ to complete. Using many of these will slow the machine down.

One of the biggest problems with the most recent generations of printers is that whilst they retain IBM, Epson FX or RX compatibility for most functions the NLQ option has really come into its own since those machines were designed. Industry giants are rarely the first to introduce new features to their products so in recent years there has been a bit of a free for all amongst printer manufacturers and no particularly reliable standard has yet emerged for NLQ codes.

This confusion inevitably means that far too few software packages provide NLQ options for printout and Amstrad has sensibly provided both a fairly easily accessible set of dip switches and a front panel button to press at power on which will set the printer automatically into NLQ mode.

The front panel controls of the printer are good if not superb. Easy to reach options allow you to send a line feed, reverse line feed, form feed, run a printer test routine

and, as mentioned, select NLQ print (although the latter two options are called by combinations of buttons which are not obvious).

One of the nicest features of the Amstrad PCW printers is their ability to 'mix and match' print styles. For instance they can produce NLQ condensed print, NLQ enlarged print, bold NLQ, etc. It is much more common for many of these print styles to be mutually exclusive, which obviously greatly reduces their flexibility.

The 4000 is no exception – NLQ print can be underlined or printed as sub- or super-script but little else. Proportional NLQ characters are possible but cannot be mixed with any other print features. There is an option for italic NLQ but you first have to be in, or switch into, Epson mode. It is a nice point of the 4000 that this switch can be software controlled, since many printers require you to turn the printer off and reset the dip switches. Even so it is a procedure that few software packages will anticipate.

The Epson model also has to be chosen to print the '£' sign or some other 'foreign characters'. Clever word processors such as *Protext* can be defined to produce bold NLQ by overprinting parts of the text twice.

The print quality of the 4000 is generally good, with the exception of the 'i', 'W' and 'V' characters which look slightly odd in high quality mode.

The manual is workable: it is very clearly laid out but begs many technical questions and at times its brevity is positively confusing. The beginner hears all that can be said about getting the machine out of the box, and is then rather thrown in at the deep end. I am still at sea over many issues such as the size of the printer's memory buffer, or whether it is possible to define new NLQ fonts (I suspect that the answer is no).

One of the worst features of the Amstrad PCW printers is that they use purpose

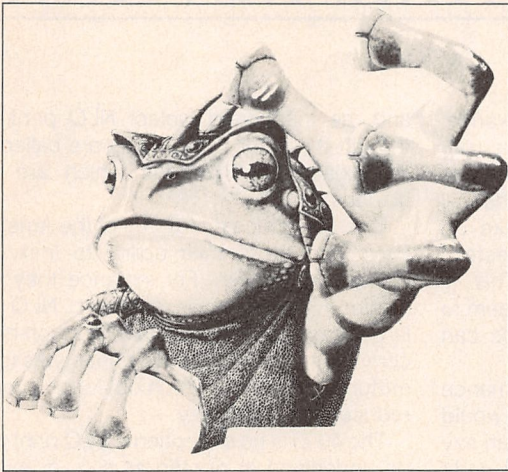
continued on page 21 ►

[illegible]

The NLQ mode: the machine doesn't slow down unbearably

[illegible]

Draft mode: some characters require a double pass



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◀ continued from page 19

designed and frighteningly expensive ribbons. At the onset this lead to temporary shortages of supply and also means that the machines, whilst cheap to buy, can be depressingly expensive to run. The day when manufacturers agree on ribbon compatibility, with a few common and therefore cheaper designs, will be worthy of celebration, but I suspect that big profits are to be made from the sale of sundry consumables if not from the machines themselves. However, I have to admit the cartridge for the DMP 4000 is easy to fit.

The 4000 provides the user with a truly excellent control over physical movement of the print head: backspaces, forward and reverse linefeeds of variable sizes, and up to eight predefined sets of horizontal and vertical tabs. Unfortunately very few off-the-shelf programs use these features which is a shame as they can be valuable time savers.

One thing that always impressed me

"One of the nicest features of the Amstrad PCW printers is their ability to 'mix and match' print styles and the 4000 is no exception"

about the PCW printer was its surprisingly quiet and un-irritating running. The 4000 is marginally louder, but still very reasonable. It hardly causes any vibration at all and the printing gets finished so quickly that it is extremely pleasant to use.

All in all the DMP 4000 is a credit to Amstrad. It is robust and sleekly designed, easy and quiet to use and likely to work without trouble. The wide carriage and the

print speed combination are exceptional on a machine of its price, and particularly when using continuous paper it makes long jobs completely effortless.

The things I dislike about it are really very minor, or, more to the point, are true of almost every competing product with the notable exception of Amstrad's own PCW. If I am slightly disappointed it is because I was hoping to see a machine that incorporated more of the good ideas that went into the latter machine, rather than just a GT version of the DMP 3000. This isn't, quite, the printer that will make Amstrad stand out in the crowded market, but it puts them in the vanguard.

Hardware Amstrad Dot Matrix Printer DMP 4000 **Micro** Any with centronics printer interface **Price** £401.35 inc VAT **Supplier** Amstrad Consumer Electronics, 169 Kings Road, Brentwood, Essex CM14 4EF (0277 228888)

DEGREES of LOADING EASE

Chris Jenkins reviews Load-It, an innovative hardware addition to the Commodore 1530 that allows you to adjust the tape head through 180 degrees of arc

Despite the increasing number of inexpensive disc drives, and the influx of complex disc-based software from the States, almost all Commodore 64 owners must have the dated 1530 Datasette cassette deck as part of their set-up.

Because the Datasette is a digital device, converting the tape signal into easily-read packets of information, it tends to be more reliable than the analogue tape recorders used with the Spectrum or Amstrad.

Problems can still arise, though, if the data isn't being read off the tape properly. Although there are several "tape head alignment" software/hardware packages on the market, it's quite possible to align the tape head to the optimum angle, only to find that it still will not load some tapes which have been improperly duplicated. The solution is Load-It, a hardware addition to the 1530 which allows you to adjust the tape head through 180 degrees of arc.

Fitting the adjuster is fairly simple, and can be done either by Load-It or by anyone with common sense, a small file and a soldering iron. The existing azimuth screw is removed and replaced by a knurled knob. A template sticker is placed across the front of the datasette, and a narrow slot cut to allow the shaft to move when the play button is pressed.

A useful bonus is the piezo transducer, soldered across an interface connector, which gives an audible reference signal

from the tape, making it easier to adjust the tape head to the correct angle.

The calibrated scale allows you to keep a record of the optimum loading position for each cassette. As multi-load games such as *Gauntlet* and *Super Cycle* becoming more common, there should be more and more demand for Load-It. The system can also be fitted to many types of data recorder, and – especially if you fit it yourself – should pay

for itself in terms of saved time and temper in no time at all.

Product Load-It head alignment kit **Micro** CBM Datasette, many types of data recorder **Price** CBM £19.95 fitted mail order, £9.95 kit; others £12.95 fitted, £7.75 kit. **Supplier** Load-It, 35 Stretton Road, Shirley, Solihull, West Midlands B90 2RX, 021-745 4970



The keys to a new SPECTRUM

While the ZX Spectrum has enjoyed considerable success since its appearance on the market five years ago, the keyboard arrangement leaves a great deal to be desired. Here, Anthony Reid gives details on how to convert your awkward Spectrum into a comfortable computer.

The ZX Spectrum has been a remarkable success since it appeared in 1982. This has not been because of its keyboard. First we had the 'dead flesh' rubber version, then the clackety plastic variation. Even disregarding the keyboard quality, unshifted keys for stop and comma, and cursor keys are well-nigh essential if you want to use any of the excellent word processing programs now available for example.

It is possible to pick up surplus computer keyboards for a few pounds and some of these can be converted with a bit of patience and a soldering iron to produce articles better than the specialist add-on makers sell for £50-£600.

Surplus keyboards can be found in com-

puter or electronic junk shops and are advertised in the electronic press. They fall into three main types, Hall effect, reed switch or direct contact switch. You usually have to have access to the printed circuit board to determine which type it is.

Hall effect keys are semiconductor devices and are practically useless for our purposes. They can be recognised by having four connections to each key and usually several chips on the circuit board. Reed switch and direct contact keys have just two connections to each switch and are equally suitable although reed switches are much the better of the two. They can often be recognised by putting your ear close to a key as you press it when a faint ping can be heard as the reeds close and open. The

next most desirable attribute is a single sided printed circuit board, as a double sided board, ie, with key connections on both sides, may make it difficult to rearrange the connections.

Now to the Spectrum. The 40 key keyboard of the Spectrum is arranged in a matrix of five columns by eight rows, each of the eight rows corresponding to half an actual row of keys on the old rubber Spectrum. Figure one shows the arrangement. Notice that to form the actual keyboard the matrix has been 'bent over' so that keys Caps Shift, A, Q and 1 are on the same column as O, P, Enter and Space. Similarly Z, S, W, 2, 9, O, L and Symbol Shift are all on the same column and so on.

Removing the screws that hold the Spectrum together, you will find the keyboard connected to the computer by two flexible tails, one of eight conductors, representing eight addresses (A0-A7), corresponding to the eight half rows, and one of five conductors corresponding to the five columns and representing the data bits D0-D4-D0 being the outside of the keyboard and D4 the centre.

The computer scans the keyboard by switching each of the eight conductors in turn to the low state. If a key is pressed,

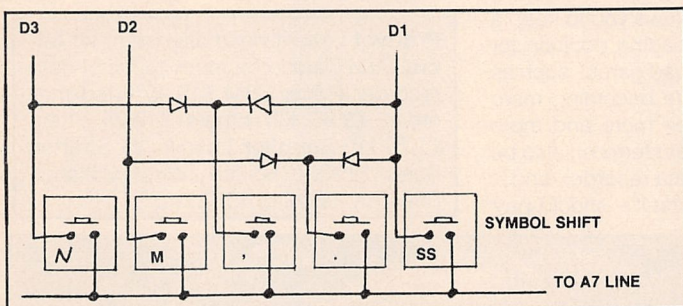


Figure 2a. Extra keys on same row as shift key

Figure 1 (below): the matrix has been 'bent over'. Figure 2a (left): the row with the shift key is expanded

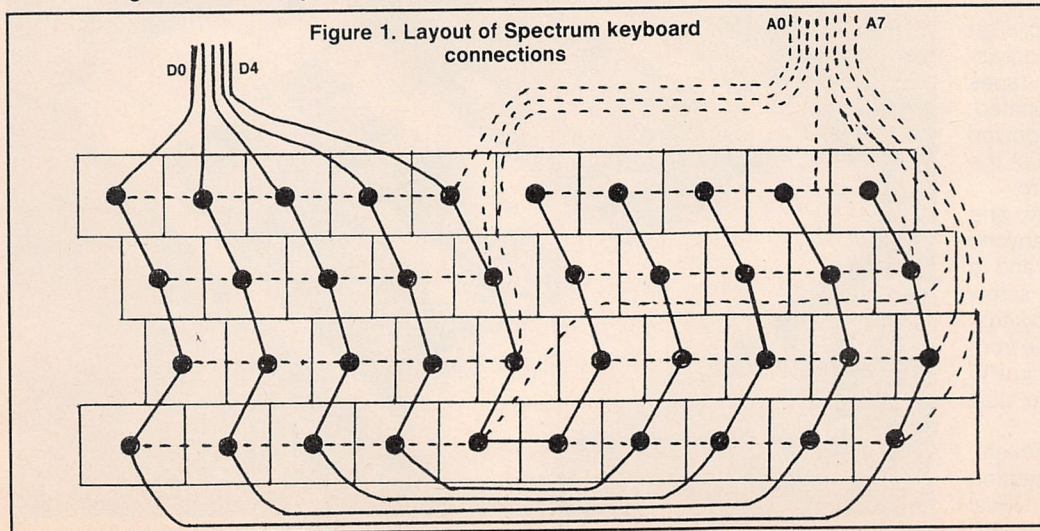
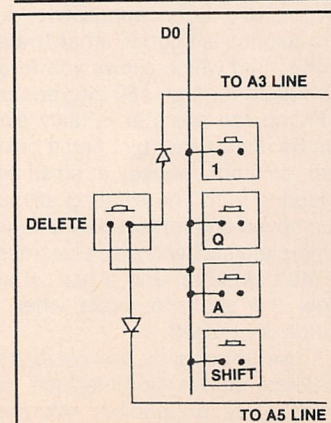


Figure 2b (below): the column is also expanded



then the corresponding column will also be pulled low and the computer will identify that particular key. (See page 160 of the old Spectrum manual.)

Examine your new keyboard to see how you can connect up the original Spectrum keys. If it is a double sided printed circuit board you will probably have to remove all the keys just to be able to see the circuit unless you are lucky enough to have one connected in a straight matrix of rows and columns. In this case you just have to cut the horizontal conductors between 5-6, T-Y, G-H and V-B. Of course the Space button will become the Space bar. If all the printed circuit is on the bottom of the board it should not be too difficult, but rather tedious, to rewire it as in Figure one.

Use a soldering iron with a bit not bigger than 3mm, fine insulated wire and cored solder. Make use of as much of the original circuit as possible. But, before starting any work, read on and decide what extra keys you want, what is possible and where you want them.

In order to print, say, a full stop two keys have to be pressed, Symbol Shift and M. These are both on the same half row and as this is scanned, both columns D1 and D2 will go low.

On the Spectrum Plus, etc, this is accomplished simply by having two data connections to the membrane bubble instead of one. We can do the same thing by connecting the two data lines D1 and D2 to the same button using diodes as in Figure two. Any small signal diode such as 1N914 or 4148 will do.

The same technique can be used for other shifted keys, *provided* they are on the same half row or column as the shift key. In practice this limits the useful ones to Edit, Delete, Stop, Comma, and Semi-colon.

Note that for keys on the same row as the shift key the diode arrows point towards the key and are in the D lines whilst for those in the same column the arrows point out of the key and are in the A lines. See Figure two.

What about extended mode? I found that the biggest single improvement to the keyboard layout was to put a Caps Shift and Symbol Shift key at each end of the keyboard. It is then so easy to press both keys together with either hand that a separate extended mode key isn't neces-

sary. The Symbol Shift should be inboard of the Caps Shift so that the Colon, another often used symbol, also becomes a one finger operation. The extra shift keys are simply wired in parallel to the existing ones.

In the same way by putting an extra 2 key immediately above the Caps Shift key on the left and a 9 key adjacent to the other Caps Shift you have both Caps Lock and Graphics available with a single press. It is possible to put these functions on a single key but it means more electronics or relays and for the amateur the result is not worth the effort. There is one more possibility which will be considered with the cursor keys.

Convenient cursor keys are really essential for word processing so it is worth a bit more trouble for them. If you have a reed switch keyboard it may be possible to fit two switches in the one key. Take one of

To connect the keyboard to the computer you will need two plugs. Cut two pieces of 0.1" Veroboard about $\frac{5}{8}$ " long, one five strips wide, the other eight. This is too thick to go into the Sinclair sockets on the computer PCB without permanently distorting them and must be filed down.

Sandwich one of the pieces between two strips of wood with about $\frac{1}{4}$ " of the Veroboard protruding and hold in a vice or pair of pliers. Now carefully file down the back of the board until you are almost through to the copper. Repeat with the other one.

The connections to the keyboard are as you would expect for the five pin plug, the pin nearest the outside of the computer being D0, the outside column of the keyboard followed in sequence to D4, the 5, T, G, V, etc, column. The eight pin connection is not in the expected sequence and is shown below:

Socket on PCB, L-R, Pin	1	2	3	4	5	6	7	8
Half row containing key	1	Q	A	O	P	C/S	ENT	SP

your keys to pieces but watch for the spring. The key top pulls off. It may be possible to drill out the reed switch cavity to take two reeds.

In my case I cut off the central column without affecting the mechanical operation of the switch leaving plenty of room for two reeds. You will probably have spare keys you can use the reeds from but otherwise they can be found in electronic surplus stores, Maplin, etc.

Tape the two reed inserts together with one slightly higher than the other. Connect this one across the Caps Shift key and the other across 5, 6, 7 or 8 as required.

If this is not possible, or you don't have reed switches, then the next best thing is to group the four cursor keys in a cross formation with another Caps Shift key in the centre and this is almost as good.

If you have a numeric keypad on your board connect them up in parallel with the number keys along the top row. Again a judiciously placed shift key in the numeric pad can make the 5, 6, 7 and 8 there much handier as cursor keys than the ones on the top row. A suggested layout is shown in Figure three.

Connect the rows and columns to their respective plugs but notice that the two printed circuit sockets face different ways. The eight pin plug must have the copper strips towards the front of the computer and the five pin towards the rear.

Leave long enough tails so that the keyboard can be opened up easily. If you are going to mount the Spectrum PCB inside the keyboard case you will have to cut a hole to make the expansion port accessible. It is a good idea, in order to save wear and tear on the Sinclair sockets to buy duplicate ear, mike, power and TV sockets for mounting on the keyboard case. Attach short leads to these sockets to plug into the Spectrum.

You may want to colour some of the key tops differently. The key tops just pull off. Humbrol enamel gives an excellent finish and mine has not worn off after two years of use. To add the Sinclair keywords rub-on lettering can be used. Letraset sell small sheets of 2.5mm lettering in various colours including white and red. If the key tops are dished it may help to cut the Letraset into strips. Finish off with a couple of coats of Humbrol clear varnish.

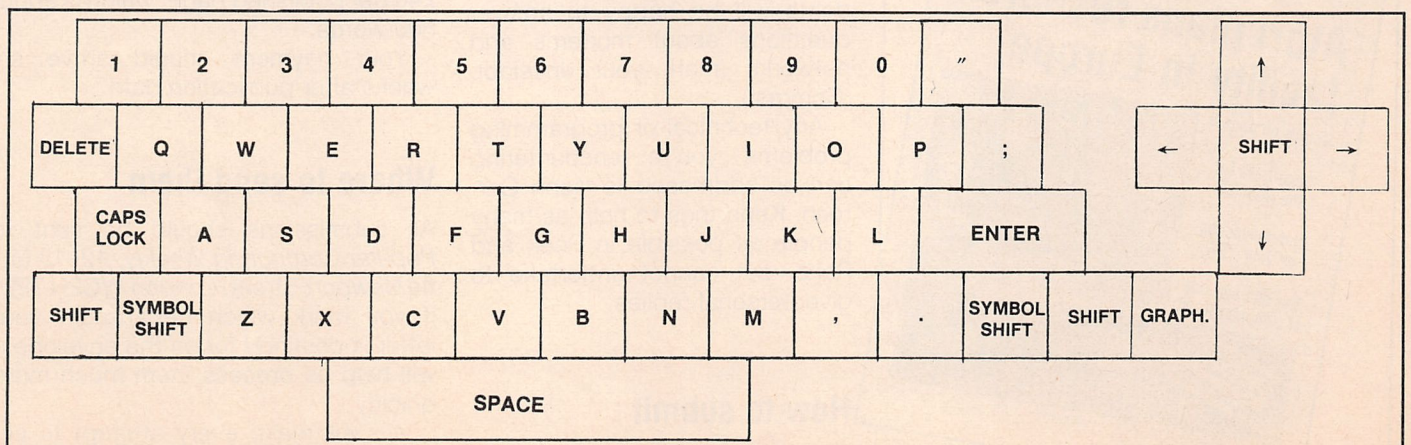


Figure 3. Suggested keyboard layout

YOUR NAME IN LIGHTS

Have you ever thought of writing articles for Popular? It's a sure fire passport to fame, if not fortune, and we always welcome contributions from readers for features and articles in the magazine.

Programs

Technical editor Duncan Evans relies on you for the programs section. It needn't be that machine code masterpiece that NASA was promising you vast sums for, what we're looking out for is handy routines, utilities, anything that you've concocted that makes your life easier as a programmer that you'd like to pass on to others.

Don't make your programs too long, please – it's best if we can print the full listing in one week, and a four part listing is probably the largest we can accept. If they're very short, then so much the better, they'll fit neatly into our Bytes and Pieces page.

Features

We're also particularly interested in articles about programming, which should be sent to Christina Erskine. If you think you could explain technical

areas of computing to a wider audience then do let us know.

We also welcome articles on any aspect of home computing, although we cannot feasibly accept anything longer than 2000 words. It's worth checking by phone or letter first that your piece will be suitable, but we're open to all ideas.

Money no object?

If it's not the money you're interested in so much as simply having your say, the Ziggurat slot is where anyone can get up on a soap box and air their opinions. Your article should be 600–650 words long. We pay £15 per Ziggurat published.

For even less money, we'd like to hear your views, comments and opinions on our Letters page, and our columnists are always on the look-out for hints and tips and comments on their own areas of the magazine.

Mark Jenkins welcomes correspondence of a musical nature for Soundcheck, Martin Bryant is interested in any queries or views regarding computer chess, and our communications correspondents will be happy to answer questions about modems and networks (mark your envelope 'Comms').

Any technical or programming problems you're encountering can be addressed to Kenn Garroch. Kenn tries to help as many people as possible in Peek and Poke, but cannot undertake to give personal replies.

How to submit

For features, it is almost always

better if you write or telephone first to discuss your ideas with us. Your articles should be typed or word processed, preferably in double spacing, using one side of the paper only.

Please don't write more than 2000 words for an article. Program notes should explain what your program achieves and how it works, but, again, please keep them concise.

Payment

Listings will be paid at a rate of £25 per published page, Bytes and Pieces at £10 each. For feature articles, we pay £40 per published page, which is about 800 words.

Your payment should arrive six weeks after publication date.

Where to send them

All submissions should be sent to *Popular Computing Weekly*, 12–13 Little Newport Street, London WC2H 7PP. If you mark which department your letter is destined for on the envelope it will help us process them much more quickly.

We will make every attempt to acknowledge receipt of your submission.



Passing Variables

John Durst

Most implementations of Basic allow you to pass parameters to machine code routines at the time of execution, usually in the form of *Call addr,var,var...* Unfortunately Spectrum Basic doesn't cater for this.

In the following routine to implement this feature, *get-vs* is made the first call in your main machine routine. Its mirror image *put-vs* is made the last call, before returning to Basic.

The syntax used is thus -

Let *u=USR (addr); REM var1,var2...*

Now, when execution is transferred to the

get-vs routine the system variable *ch-add* points to the character in the program immediately after (*addr*). In this case, the colon, ":". The first thing to do is to save this address on the stack, so that it can be replaced, to avoid trouble before returning to Basic.

Next, the *ch-add* point is moved along two positions, so that it points to the first letter of the first variable name, and the Rom routine at 28B2h is called. Under these circumstances the routine returns with *HL* pointing to the last character of the matching variable name, in the Basic variables area. This is the character immediately before the five bytes which hold the value of the numerical variable. After this, it is a snip to transfer the value of the variable to a safe address, for the use of your machine routine.

Once the transfer is complete, the routine moves along the variable name in the *Rem* statement, until it finds an alphanumeric character. If this is comma, it sets to work on the next variable, if it is a new line it

returns to your main *USR* routine.

As I was only interested in variables containing small integers, less than 256, I have merely accessed the single byte containing the value in the variable, and put it into the printer buffer starting at 5B00h. However, you could just as well collect the complete five bytes holding the floating point value, and even transfer up to four variables directly to the calculator memory, starting at *MEM*, so that the calculator could get to work on them directly.

To put the routine into reverse, simply means changing a couple of bytes. Once this has been done the values can be taken by the routine from the safe addresses and restored to the appropriate variable, in the Basic variables area.

Because the two routines, *get-vs*, which collects the variables values, and *put-vs* which restores them, are so nearly identical, I have made the entry point of each routine modify the code (it only exchanges the *HL* and *DE* registers) before going to work, using the same code block.

```
*HISOFT GEN3M2 ASSEMBLER* for ZX SPECTRUM
```

```
Pass 1 errors: 00
```

```
GET VARIABLES
```

```

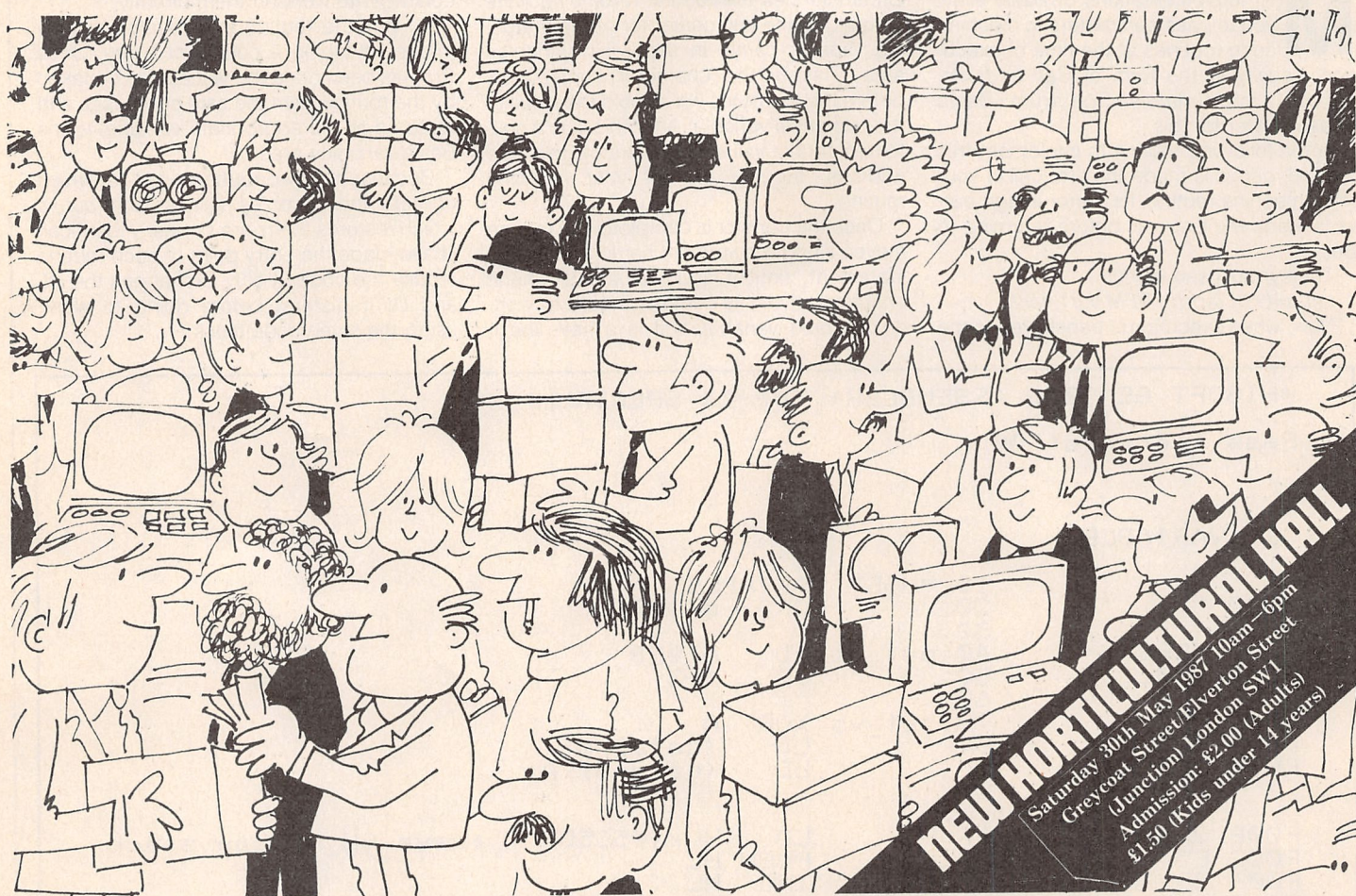
F000      10 *HGET VARIABLES
          20      ORG  #F000
          30
F000 3EEB      40 put_vs LD  A,#EB
F002 1801      50      JR  $+3
          60
F004 AF        70 get_vs XOR  A
F005 3220F0     80      LD  (gate),A
F008 3223F0     90      LD  (gate+3),A
          100
          110
F00B 2A5D5C    120      LD  HL, (#5C5D) ;save CH_ADD on stack
F00E E5        130      PUSH HL
F00F 23        140      INC  HL
F010 23        150      INC  HL ;point to var/name in REM
F011 11005B    160      LD  DE,#5B00 ;= Printer buffer
F014 E5        170 v_lp  PUSH HL
F015 D5        180      PUSH DE
F016 225D5C    190      LD  (#5C5D),HL
F019 CDB228    200      CALL #28B2 ;LOOK_VARS
F01C 23        210      INC  HL
F01D 23        220      INC  HL
F01E 23        230      INC  HL
F01F D1        240      POP  DE
F020 00        250 gate  DEFB 0 ;switch these Bytes
F021 EDA0      260      LDI  0 ;between "NOP" & "EX DE,HL"
F023 00        270      DEFB 0
F024 E1        280      POP  HL
F025 7E        290 d_tst LD  A,(HL)
F026 23        300      INC  HL
F027 FE0D      310      CP   13 ;vars finished?
F029 2806      320      JR  Z,end
F02B FE2C      330      CP   ","
F02D 20F6      340      JR  NZ,d_tst
F02F 18E3      350      JR  v_lp
F031 E1        360 end   POP  HC
F032 225D5C    370      LD  (#5C5D),HL ;restore CH_ADD
F035 C9        380      RET

```

```
Pass 2 errors: 00
```

```
Table used: 83 from 179
```


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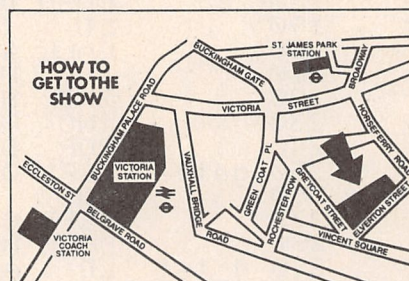
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Hardcopy Bazaar

P A Ferris

These two programs are utilities for any Epson compatible printer and enable all facets of using a printer to be controlled easily.

Program one deals with setting the tabulation for printing, number of lines per page and spacings for lines and the like.

Program two enables you to set up the escape codes required for underline, bold, italic and a host of other print styles, just by using the cursor keys and Copy.

Listing 1

```
10 REM ** PRINTER CONTROL CODES **
20 MODE 1:SYMBOL AFTER 203:SYMBOL 204,1,
3,135,206,220,248,240,224
30 DIM f$(5):FOR x=1 TO 5:f$(x)=CHR$(203)
):NEXT:f$(2)=CHR$(204)
40 y$(8)=CHR$(27)+"@"
45 LOCATE 5,11:PRINT"PLEASE PUT YOUR PRI
NTER ON LINE"
50 PRINT #8,CHR$(27)+"e";
55 CLS
60 DIM x$(5)
70 FOR a=1 TO 5:x$(a)=CHR$(203):NEXT:X$(
2)=CHR$(204)
80 PRINT"Left hand margin 000":PRINT:PR
INT"Right hand margin 000":PRINT:PRINT"L
ines per page 066":PRINT:PRINT"Lines
per page 011":PRINT:PRINT:PRINT"LINE
FEED OPTIONS":PRINT"-----":P
RINT:PRINT"Spacing 7/72"+CHR$(34)
90 PRINT:PRINT"Default 1/6":CHR$(34):PRI
NT:PRINT"Single spacing":PRINT:PRINT"Dou
ble spacing":PRINT:PRINT"Triple spacing"

100 LOCATE 25,1:PRINT"Enter your Nos."
110 LOCATE 25,3:PRINT"Top 4 rows only"
120 LOCATE 25,7:PRINT"Press ""Q"" to Qui
t"
130 LOCATE 25,11:PRINT"Use cursors up":L
OCATE 25,13:PRINT"and down to move":LOCA
TE 25,15:PRINT"arrow and COPY"
140 LOCATE 23,17:PRINT"          to":LOCAT
E 25,19:PRINT"select or change"
143 LOCATE 27,23:PRINT CHR$(164);" PAF &
TTW"
145 LOCATE 10,25:PRINT"PRINTER TABULATIO
N MENU"
150 cx=23:cy=1
160 FOR x=1 TO 5:LOCATE 20,11+x*2:PRINT
f$(x):NEXT
170 LOCATE cx,cy:PRINT CHR$(242)
180 x$=INKEY$: IF x$="" THEN 180
190 LOCATE cx,cy:PRINT " "
200 IF x$=CHR$(240) AND cy=13 THEN cy=cy
-6:GOTO 220
210 IF x$=CHR$(240) AND cy>1 THEN cy=cy-
2
220 IF x$=CHR$(241) AND cy=7 THEN cy=cy+
6:GOTO 240
230 IF x$=CHR$(241) AND cy<21 THEN cy=cy
+2
240 IF x$=CHR$(224) THEN GOTO 270
250 IF UPPER$(x$)="Q" THEN CALL 0
260 GOTO 170
```

```
270 IF cy<8 THEN GOSUB 360:GOTO 170
280 IF cy=13 THEN PRINT#8,CHR$(27)+"1";
290 IF cy=15 THEN PRINT#8,CHR$(27)+"2";
300 IF cy=17 THEN PRINT#8,CHR$(27)+"A"+C
HR$(24);
310 IF cy=19 THEN PRINT#8,CHR$(27)+"A"+C
HR$(36);
320 IF cy=21 THEN PRINT#8,CHR$(27)+"A"+C
HR$(48);
330 FOR x=1 TO 5:f$(x)=CHR$(203):NEXT
340 f$((cy-11)/2)=CHR$(204)
350 GOTO 160
360 REM *** input routine ***
370 LOCATE 19,cy
380 PAPER 1:PEN 0:PRINT"000":LOCATE 19,c
y
390 Y$=""
400 FOR X=1 TO 3
410 x$=INKEY$: IF x$="" THEN 410
420 IF x$<"0" OR x$>"9" THEN 410
430 PRINT x$;
440 Y$=Y$+X$
450 NEXT
460 PAPER 0:PEN 1:LOCATE 19,cy:PRINT Y$
470 IF cy=1 THEN GOTO 510
480 IF cy=3 THEN GOTO 540
490 IF cy=5 THEN GOTO 570
500 IF cy=7 THEN GOTO 620
510 Y=VAL (Y$):IF Y>255 THEN 360
520 PRINT#8,CHR$(27)+"1"+CHR$(y);
530 RETURN
540 Y=VAL (Y$):IF Y>255 THEN 360
550 PRINT#8,CHR$(27)+"Q"+CHR$(y);
560 RETURN
570 Y=VAL (Y$):IF Y>127 OR y<1 OR (y/6<
INT(y/6)) THEN 360
580 PRINT#8,CHR$(27)+"C"+CHR$(y);
590 y=y/6:LOCATE 19,cy+2:PRINT"000":LOCA
TE 23-LEN(STR$(y)),cy+2:PRINT RIGHT$(STR
$(y),LEN(STR$(y))-1)
600 PRINT#8,CHR$(27)+"C"+CHR$(0)+CHR$(y)
;
610 RETURN
620 Y=VAL (Y$):IF Y>21 OR y<1 THEN 360
630 PRINT#8,CHR$(27)+"C"+CHR$(0)+CHR$(y)
;
640 y=y*6:LOCATE 19,cy-2:PRINT"000":LOCA
TE 23-LEN(STR$(y)),cy-2:PRINT RIGHT$(STR
$(y),LEN(STR$(y))-1)
650 PRINT#8,CHR$(27)+"C"+CHR$(y);
660 RETURN
Listing 2
10 REM ** PRINTER CONTROL CODES **
20 CLS
```

```
25 LOCATE 5,11:PRINT"PLEASE PUT YOUR PRI
NTER ON LINE"
30 DIM z$(12)
40 z$(7)=CHR$(27)+"M":z$(2)=CHR$(27)+"4"
:z$(1)=CHR$(27)+"-"+CHR$(1):z$(4)=CHR$(2
7)+"W"+CHR$(1):z$(3)=CHR$(15):z$(11)=CHR
$(27)+"x"+CHR$(1):z$(9)=CHR$(27)+"S"+CHR
$(1):z$(12)=CHR$(27)+"S"+CHR$(0):z$(10)=
CHR$(27)+"p"+CHR$(1):z$(6)=CHR$(27)+"G"
50 z$(5)=CHR$(27)+"E":z$(8)=CHR$(27)+"N"
+CHR$(5)
60 DIM y$(12)
70 y$(7)=CHR$(27)+"p":y$(2)=CHR$(27)+"5"
:y$(1)=CHR$(27)+"-"+CHR$(0):y$(4)=CHR$(2
7)+"W"+CHR$(0):y$(3)=CHR$(18):y$(11)=CHR
$(27)+"x"+CHR$(0):y$(9)=CHR$(27)+"T":y$(
12)=CHR$(27)+"T":y$(10)=CHR$(27)+"p"+CHR
$(0):y$(6)=CHR$(27)+"H":y$(5)=CHR$(27)+"
F"
80 y$(8)=CHR$(27)+"0"
90 PRINT #8,CHR$(27)+"@";
100 DIM x$(12)
110 FOR a=1 TO 12:x$(a)=CHR$(203):NEXT
120 MODE 1:SYMBOL AFTER 203:SYMBOL 204,1
,3,135,206,220,248,240,224
130 PRINT"Underline":PRINT:PRINT"Italics
":PRINT:PRINT"Condensed":PRINT:PRINT"Dou
ble Width":PRINT:PRINT"Bold":PRINT:PRINT
"Double Strike":PRINT:PRINT"Mini":PRINT:
PRINT"Skip Perf.":PRINT:PRINT"Subscript"
:PRINT:PRINT"Proportional":PRINT:PRINT"N
.L.Q."
140 PRINT:PRINT"Superscript":PRINT:PRINT
"Flush buffer *";
150 LOCATE 23,1:PRINT"Press ""P"" for ":
LOCATE 23,3:PRINT"a test print":LOCATE 2
3,7:PRINT"Press ""Q"" to Quit":LOCATE 23
,11:PRINT"Use cursors up":LOCATE 23,13:P
RINT"and down to move":LOCATE 23,15:PRIN
T"arrow and COPY to"
160 LOCATE 23,17:PRINT"select or cancel.
"
165 LOCATE 23,21:PRINT"PRINTER CONTROL"
167 LOCATE 23,23:PRINT" CODE MENU"
169 LOCATE 23,25:PRINT CHR$(164),"PAF &
TTW"
170 FOR x=1 TO 24 STEP 2
180 LOCATE 15,x:PRINT x$(x/2)
190 NEXT
200 cx=15:cy=1
210 LOCATE cx+2,cy
220 PRINT CHR$(242)
230 a$=INKEY$: IF a$<" " THEN 230
```


PROGRAMMING: AMSTRAD CPC

```

240 a$=INKEY$: IF a$="" THEN 240
250 IF a$=CHR$(240) AND cy>1 THEN cz=cy-
2:GOTO 390
260 IF a$=CHR$(241) AND cy<24 THEN cz=cy
+2:GOTO 390
270 IF a$=CHR$(224) THEN GOSUB 310
280 IF UPPER$(a$)="P" THEN PRINT#8,"This
is a test print"

```

```

290 IF UPPER$(a$)="Q" THEN CALL 0
300 GOTO 230
310 IF cy=25 THEN PRINT#8, CHR$(27)+"@"+
CHR$(7);:GOTO 110
320 IF x$((cy-1)/2+1)=CHR$(203) THEN GO
TO 360
330 x$((cy-1)/2+1)=CHR$(203):LOCATE cx,c
y:PRINT x$((cy-1)/2+1)

```

```

340 PRINT#8,y$((cy-1)/2+1);
350 GOTO 380
360 x$((cy-1)/2+1)=CHR$(204):LOCATE cx,c
y:PRINT x$((cy-1)/2+1)
370 PRINT#8,z$((cy-1)/2+1);
380 RETURN
390 LOCATE cx+2,cy:PRINT " ":cy=cz
400 GOTO 210

```

PROGRAMMING: C64

Micromon

P A Fairclough

Micromon is a multi-function machine code programming utility that will be presented over four weeks. Long, but well worthwhile. More of the instructions follow next week.

Entering Micromon

Type in the listing and run it. Enter the monitor with `SYS 12* 4096`. Save Micromon as a m/c program with `(S "Micromon",01,C000,D000,01)`. Micromon's 26 commands are described below.

Instant Commands

When the cursor up key is pressed at the top of the screen or the cursor down key is pressed at the bottom of the screen, the screen scrolls in that direction and the nearest legal command (disassemble, memory or interpret) from the cursor is executed.

The following keys used with the C= key have the following functions.

F1 will switch off all printer communication.

F3 will send all output to the serial printer instead of the screen (I think).

F5 will send all output to the parallel printer. Output is also sent to the screen.

F7 will add \$0400 to the screen address (usually \$0400) therefore moving it up in memory. The screen may be moved to any of the 64 possible addresses in the computer's memory.

CTRL has the opposite effect of F7 by moving the screen down in memory.

Parameter Commands

The following commands are entered by typing the command letter and parameters. If more than one parameter is required then they must be separated by a character. Pressing RETURN executes the command. The different types of parameters are:-

addr - a 16 bit address, eg C000
nnnn - a 16 bit number, eg 00FF
value - an 8 bit number, eg EA
device - an 8 bit device number, eg 08
sec - an 8 bit secondary address eg 01
opcode - a legal 6502 mnemonic, eg ROR
operand - a legal addressing mode eg #90
data - a string or a number of hex values eg "DATA or EA A9 00
offset - a 16 bit offset, eg F000

A - Assemble.

Format : A addr opcode operand

Assemble allows the user to assemble machine code. The next address is displayed ready for more input.

The value used in the operand may be of the following:

(i) hexadecimal eg \$00
(ii) decimal eg 32768
(iii) binary eg %01010101
(iv) CBM ASCII eg "K"

B - Breakpoint.

Format : B addr
or B addr,nnnn

Breakpoint allows the user to set up a breakpoint at a specified address so the program does not fully execute. The breakpoint will occur the first time it is encountered. If nnnn is used then the program will pass through the breakpoint that many times before it occurs.

C - Compare.

Format : C addr,addr,addr

Compare allows the user to compare two blocks of memory, displaying any addresses not containing the same value.

The first two addresses indicate the first block and the third address indicates the start of the second block.

D - Disassemble.

Format : D addr
or D addr,addr

Disassemble will allow the user to disassemble memory.

If the opcode or the operand is changed and RETURN pressed then it will be assembled.

E - Evaluate.

Format : E \$nnnn
or E n
or E %nnnnnnnnn
or E "n"

Exchange will allow the input of a number in either base 2, 10 or 16 or a character and will then display it in all four bases.

The number may be preceded by a dollar sign (hexadecimal) or a percent sign (binary). A decimal number needs no prefix. A character requires inverted commas around it.

```

0 S=49152:FDRA=0T000511:T=0
1 FORB=0T07:GOSUB4:NEXT
2 READC:IFC<>TTHENPRINT"?CHECK SUM";:GOTO9
3 NEXT:END
4 READC$:D$=MID$(C$,2)
5 C=(ASC(C$)-48+7*(ASC(C$)>57))*16
6 C=C+ASC(D$)-48+7*(D$>"9")
7 IFC>-1ANDC<256THENPOKEC,C:S=S+1:T=T+C:RETURN
8 PRINT"?DATA RANGE";
9 PRINT" ERROR IN"PEEK(63)+PEEK(64)*256;:END
10000 DATAA2,F8,9A,D8,A9,00,85,14,1102
10001 DATA85,15,85,FA,85,1A,85,42,895
10002 DATAA2,07,86,FB,A9,93,20,E4,1130
10003 DATAC0,20,7D,C3,A2,05,20,66,845
10004 DATAC1,78,AD,18,03,85,0D,AD,832
10005 DATA19,03,85,0E,AD,EE,CF,AE,967
10006 DATAEF,CF,8D,16,03,8E,17,03,780
10007 DATA20,CF,C9,A9,04,85,F8,A9,1163

```

```

10008 DATA06,85,F9,58,00,68,85,07,720
10009 DATA68,85,06,68,85,05,68,85,722
10010 DATA04,68,85,02,68,85,03,BA,669
10011 DATA86,08,38,D8,A5,02,E9,02,816
10012 DATA85,02,B0,02,C6,03,20,CF,753
10013 DATAC9,A5,1A,F0,13,20,73,CC,1002
10014 DATAA5,43,D0,06,A5,44,D0,05,892
10015 DATAF0,06,4C,14,C7,4C,12,C7,834
10016 DATAA2,42,20,E2,C0,A9,28,20,919
10017 DATAE4,C0,A9,29,20,A1,C8,4C,1099
10018 DATA4D,C9,A9,3F,20,E4,C0,A6,1128
10019 DATA08,9A,A9,0D,20,16,E7,A9,798
10020 DATA80,20,90,FF,A9,00,85,28,901
10021 DATA85,39,20,15,C6,F0,FB,A2,1094
10022 DATA19,DD,9C,CF,F0,05,CA,10,1072
10023 DATAF8,30,D7,85,19,85,39,8A,997
10024 DATA0A,AA,BD,B6,CF,85,C1,BD,1273
10025 DATAB7,CF,85,C2,6C,C1,00,78,1138

```



```

10026 DATA48,A5,01,29,F8,05,F8,85,913
10027 DATA01,68,60,20,E4,C0,A9,20,854
10028 DATAD0,02,A9,0D,20,16,E7,C9,878
10029 DATA0D,D0,05,20,F0,C0,A5,42,921
10030 DATA48,A5,9A,C9,04,68,90,03,847
10031 DATA20,D2,FF,48,8D,01,DD,8A,1070
10032 DATA48,98,48,A6,FB,10,41,A5,959
10033 DATA39,48,A9,01,85,39,A9,FF,913
10034 DATA8D,03,DD,A9,7F,8D,0D,DD,1036
10035 DATAAD,00,DD,29,FB,8D,00,DD,1048
10036 DATAA0,03,88,D0,FD,09,04,8D,914
10037 DATA00,DD,A0,00,AD,0D,DD,29,829
10038 DATA10,D0,0D,EE,20,D0,D0,F4,1167
10039 DATAES,0E,F1,C8,D0,EE,84,FB,1710
10040 DATAA9,0E,8D,20,D0,68,85,39,858
10041 DATA68,A8,68,AA,68,60,20,CF,985
10042 DATACO,C1,09,08,4C,17,C2,B4,875
10043 DATAC1,D0,08,B4,C2,D0,02,E6,1223
10044 DATA28,D6,C2,D6,C1,60,BD,96,1290
10045 DATACF,85,27,8A,0A,AA,BD,F4,1130
10046 DATACF,85,FC,BD,F5,CF,85,FD,1619
10047 DATAA0,00,B1,FC,20,E4,C0,C8,1241
10048 DATAC4,27,90,F6,60,A4,26,A5,1088
10049 DATA25,4C,90,C1,A4,C4,A5,C3,1170
10050 DATA38,E5,C1,85,24,98,E5,C2,1222
10051 DATAA8,05,24,60,20,63,C8,20,668
10052 DATAE2,C0,20,8C,C1,20,B3,C8,1194
10053 DATA90,16,20,F6,C1,E6,C3,D0,1270
10054 DATA02,E6,C4,20,2F,C9,D0,05,921
10055 DATA20,85,C1,B0,ED,4C,97,C0,1190
10056 DATA20,85,C1,18,A5,24,65,C3,879
10057 DATA85,C3,98,65,C4,85,C4,A2,1268
10058 DATA01,B5,25,48,B5,C1,95,25,851
10059 DATA68,95,C1,CA,10,F3,20,F6,1185
10060 DATAC1,20,85,C1,B0,D7,A2,00,1104
10061 DATA20,57,C1,A2,02,20,57,C1,788
10062 DATAA4,28,D0,C9,F0,E8,20,48,1189
10063 DATACC,48,20,44,CC,68,A4,19,873
10064 DATACO,43,F0,24,A2,02,D0,02,909
10065 DATAA2,00,08,48,20,58,CC,20,598
10066 DATACF,C0,68,A2,00,81,09,48,875

```

```

10067 DATAA9,2F,85,00,A5,01,29,FE,810
10068 DATA05,F9,85,01,68,28,58,60,716
10069 DATA20,4E,C1,F0,0B,20,8B,C8,925
10070 DATA20,DE,C0,20,E1,FF,F0,85,1331
10071 DATA60,20,7D,C8,20,D4,C8,90,1041
10072 DATA14,85,1E,A5,1E,20,78,C8,734
10073 DATA20,2F,C9,D0,05,20,8C,C1,858
10074 DATAB0,F1,4C,97,C0,4C,92,C0,1250
10075 DATA20,7D,C8,20,15,C6,A2,00,770
10076 DATA86,27,20,15,C6,F0,FB,C9,1116
10077 DATA22,D0,10,20,C6,2F,20,15,C6,746
10078 DATA9D,00,02,E8,20,1D,C6,F0,890
10079 DATA17,D0,F5,86,2A,20,DC,C8,1104
10080 DATA90,D3,9D,00,02,E8,20,1D,807
10081 DATAC6,F0,05,20,D7,C8,B0,F2,1308
10082 DATA86,1D,20,E2,C0,A2,00,A0,935
10083 DATA00,20,66,CC,DD,00,02,D0,769
10084 DATA1D,C8,E8,E4,1D,D0,F2,A5,1333
10085 DATA27,30,05,20,ED,C8,F0,C3,806
10086 DATA20,20,C4,A9,10,A6,27,30,698
10087 DATA02,A9,08,20,9D,C3,20,2F,642
10088 DATAC9,D0,0A,20,E1,FF,F0,05,1176
10089 DATA20,8C,C1,B0,C8,4C,97,C0,1160
10090 DATA20,AF,C4,20,8C,C1,90,0B,923
10091 DATA20,11,C3,20,99,C3,20,E1,881
10092 DATAFF,D0,F0,20,E3,CB,4C,9F,1400
10093 DATACO,A2,02,A8,B9,C1,CE,85,1241
10094 DATA25,B9,01,CF,85,26,A5,29,807
10095 DATA85,21,A9,00,A0,04,06,26,543
10096 DATA26,25,2A,88,10,F8,69,3F,685
10097 DATA20,E4,C0,CA,10,EC,4C,DE,1204
10098 DATACO,20,E2,C0,A9,2C,20,88,1023
10099 DATAC8,20,DE,C0,20,B4,C3,20,1085
10100 DATAE9,C2,A2,05,E0,02,D0,15,1049
10101 DATAA4,20,F0,11,A5,29,C9,E8,1092
10102 DATA20,66,CC,85,1E,B0,41,20,774
10103 DATA91,C3,88,D0,EF,06,29,90,1114
10104 DATA0C,BD,B5,CE,20,E4,C0,BD,1229
10105 DATABB,CE,20,E4,C0,CA,10,D4,1275
10106 DATAA5,21,29,20,F0,25,A2,02,712

```

PROGRAMMING: ST

Squash

Mick West

The problem with storing lots of screens on disc is that they take up 32k each. With this compressor pro-

gram, written using Megamax C, a picture file can be reduced to anything as little as 6k, although the average is 16k.

When run the program asks for a file to load. If the file extender is MIK then the file is decompressed. If it is anything else then it is squashed.

When compressing the file you are prompted as to whether the picture has lots of areas the same colour (wide), an average

amount (medium) or closely packed colours (small). Files that are defined as wide gain the maximum benefit from being compressed.

For a copy of the program (compiled and source) send £4.00, or £2.00 with a blank disc, to 48 Norman Street, Bingley, W Yorks BD16 4JT.

The other half of the listing follows next week.

```

/*****
** Program name : COMPRESS.C
** Written by : Mick West
** Using : Megamax C on Atari ST
** Date started : 16/4/87 Date completed: 21/4/87 **
*****/
** Program Function
** Compress a picture file or decompress a MIK file
*****/

```

```

#include <stdio.h>
#include <osbind.h>
#include <gembind.h>

```

```

#define piclen 40000L /* enough for any pic format */

```

```

FILE *fptr, *fopen();

```

```

char pathname[51];
char filename[13];

```

```

char *in_array,*out_array,*ptr1,*ptr2;
int button,frames,length,handle,error;
int addr,max,chunk,chunk_pos,i;
long in_length,out_length,pos,out_pos;
main()
{
    register int i;
    in_array = (char *)Malloc(piclen); /* reserve memory */
    out_array = (char *)Malloc(piclen);
    appl_init();
    button=1;
    while (button!=1)
    {
        Cconout(27); /* clear screen */
        Cconout('E');
        for(pos=0;pos<piclen;out_array[pos++]=0);
        pathname[0]='A';pathname[1]=':';pathname[2]='\\';
        pathname[3]=pathname[5]='*';pathname[4]='.';
        for(i=6;i<=51;pathname[i++]=0);
        for(i=0;i<=13;filename[i++]=0);
    }
}

```


PROGRAMMING: ST

```
fset_input(pathname,filename,&button); /* get the file name */
if (button)
{
    ptr1=pathname;
    while(*ptr1++); /* find end of string */
    while(*ptr1!='\\') /* find last \ and */
    *ptr1--; /* replace the */
    ptr2=filename; /* remainder by the */
    while(++ptr1 == *ptr2++); /* filename */
    handle = Fopen(pathname,0);
    if ( handle < 0)
    {
        button=form_alert(1,"[3][Cannot open file][Cancel]");
    }
    else
    {
        /* read the file */
        in_length = Fread(handle,piclen,in_array);
        Fclose(handle);
        while(*--ptr1!='. '); /* go back to the dot */
        for(i=1;i<3;filename[i++]=*ptr1); /* get the extension */
        if ((filename[1]=='M')&&(filename[2]=='I')&&(filename[3]=='K'))
        {
            printf("decompressing, please wait ....\n");
            decode(); /* decode a MIK file */
            while(*--ptr1!='. '); /* go back to the dot */
            ***ptr1=in_array[2]; /* get old extension */
            ***ptr1=in_array[3];
            ***ptr1=in_array[4];
            save(); /* and save decoded */
        }
        else
        {
            button = form_alert(1,
                "[2][ What mode ?][low:med:high]");
            frames = 1 << (3-button);
            button = form_alert(1,
```

```
"[2][ Spacing ][small:medium:wide]");
            length = 1 << button;
            max = (1 << length) - 1;
            printf("Compressing, Please wait.... \n");
            encode(); /* encode a picture */
            printf("new length = %lu \n",out_length);
            printf("old length = %lu \n",in_length);
            while(*--ptr1!='. '); /* go back to the dot */
            ***ptr1='M'; /* set new extension */
            ***ptr1='I';
            ***ptr1='K';
            save(); /* and save compressed*/
        }
    }
    button=form_alert(1,"[2][Any more ?][YES:NO]");
}
Mfree(in_array); /* free the memory */
Mfree(out_array);
appl_exit();
}

encode()
{
    register int colour,bit_no,bit,frame;
    int step;
    out_array[0]=frames;
    out_array[1]=length;
    out_array[2]=filename[1];
    out_array[3]=filename[2];
    out_array[4]=filename[3];
    out_array[5]=(in_length >> 8) & 255;
    out_array[6]=in_length & 255;
    pos=7;
    for (frame=1; frame<=frames;frame++)
```

PROGRAMMING: BBC

Magic Maze

Mark Weatherill

This is it. The final week of Magic Maze, the game with continuous music, sprites and inventive puzzles. Now, if you've typed all the listings in

correctly and, cassette owners, saved them in the right order, then it'll be a miracle. The rest of you have fun debugging. Persevere and the game will be even more fun.

If you don't want to type it in then send £2.00 (cassette) to 18 Kingsland, Aylesbury, Bucks HP21 9SY.

```
460 DATA 0,0,0,0,0,224,0,0,0,0,0,224,0
,0,0,0,0,0,0,224,0,0,0
470 DATA 0,0,0,0,224,0,0,0,0,0,224,0
,0,0,0,0,0,0,224,0,0
480 DATA 0,0,224,0,0,0,0,0,0,0,0,0,0
,224,224,0,224,0,0,0,0,0,0
490 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0
500 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0
510 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,224,224,224,224,224,224,0,224
520 DATA 224,0,224,224,224,224,224,224
,0,0,0,0,0,0,0,0,0,0,0,0,0,0
530 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0
540 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,2
29,229,229,229,0,0,0,0,0
550 DATA 0,0,0,0,229,229,225,0,0,225,2
29,229,0,0,0,0,0,0,229,229,225,0,225,0
560 DATA 0,225,0,225,229,229,0,0,224,2
24,224,224,224,224,224,224,224,224,224,2
24,224,224,224,224
570 DATA 224,224,224,224,224,224,224,2
24,224,224,224,224,224,224,0,229,224,0,0
,0,0,0,0,0
```

```
580 DATA 0,0,0,0,0,0,0,229,224,0,0,0,0
,0,0,0,0,0,0,0,0,0,229
590 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,229,224,0,0,0,0,0,0,0
600 DATA 0,0,0,0,0,0,0,224,224,224,0,0,0
,0,0,0,0,0,0,0,0,0,229
610 DATA 224,0,0,0,0,0,0,0,0,0,224,2
24,0,0,229,224,224,224,224,0,0,0,0
620 DATA 0,0,0,0,0,0,0,229,0,0,0,0,0
,0,224,224,0,0,0,0,0,229
630 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0
,229,0,0,0,0,0,0,0,0
640 DATA 0,0,0,0,0,0,0,229,0,0,0,224,2
24,0,0,0,0,0,0,0,0,0,229
650 DATA 224,224,224,224,0,0,0,0,0,0,0
,0,0,0,0,229,0,0,224,0,0,0,0
660 DATA 0,0,0,0,0,0,0,229,0,0,224,0,0
,0,0,0,0,0,0,0,0,229
670 DATA 0,0,224,0,0,0,0,0,0,0,0,0,0
,0,229,0,0,224,224,224,224,224,0
680 DATA 0,0,0,0,0,0,0,229,0,0,0,0,0,0
,224,0,0,0,0,0,0,0,229
690 DATA 0,0,0,0,0,0,224,0,0,0,0,0,0,0
,0,229,224,224,224,224,224,224,224
700 DATA 224,224,224,224,224,224,224,2
24,224,224,224,224,224,224,224,0
```

```
,224,224,224,224,0,0
710 DATA 224,0,0,0,0,229,0,0,0,0,0,0,0
,224,0,0,224,0,0,0,0,229,0,0
720 DATA 0,0,0,0,0,0,224,0,0,224,0,0,0
,229,0,0,0,0,0,0,0,224,224,224
730 DATA 224,0,0,0,0,229,229,0,0,0,0,0
,0,0,0,224,224,0,224,0,0,0,0
740 DATA 229,229,0,0,0,0,0,224,224,0,0
,0,0,0,0,0,0,0,0,0,0,224
750 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,224,224,0,0,0,0,0,0
760 DATA 0,0,0,0,0,0,224,224,0,0,0,0
,0,226,226,226,0,0,0,0,0,224
770 DATA 224,224,0,0,0,0,0,0,0,0,0,0
,0,0,224,224,0,0,0,0,0,0
780 DATA 0,0,0,0,0,0,224,224,0,0,0,0
,226,226,226,226,226,0,0,0,0,0,224
790 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,224,224,0,0,0,0,0
800 DATA 0,0,0,0,0,0,224,224,0,224,0
,226,226,226,226,226,226,226,0,0,0,224
810 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,224,0,0,0,0,0,0
820 DATA 0,0,0,0,0,0,0,0,0,224,0,0,0,0
,0,0,0,0,0,0,0,0,0
830 DATA 80,121,114,97,109,105,100,224
```



```
,0,224,224,224,224,224,224,224,0,224,224
,224,224,224,224,224
840 DATA 224,224,224,224,224,224,224,224,2
24,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
850 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,224,224,224,224,224,224,224,224,224
860 DATA 0,0,0,0,0,0,0,224,0,0,0,0,0,0,0
,0,224,224,0,0,0,0,0,0,0
870 DATA 0,0,0,0,0,0,0,0,0,0,224,224,0,0,0
,0,0,0,0,0,0,0,0,0,0,0
880 DATA 0,224,224,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,224,224,0,224,224,224
890 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,224,0,0,0,0,0,0,0
900 DATA 0,0,0,0,0,0,0,224,0,0,0,0,0,0,0
,0,0,224,224,224,224,224,224,224,224
910 DATA 0,0,0,0,0,0,0,224,224,0,0,0,0,0
,0,0,224,0,0,0,0,0,0,224,224
920 DATA 0,0,0,0,0,0,0,0,0,224,0,0,0,0,0,2
24,224,0,0,0,0,0,0,0,0,224
930 DATA 0,0,0,0,224,224,0,0,0,0,0,0,0,0
,0,0,224,0,0,0,224,224,0,0,0
940 DATA 0,224,224,224,224,224,224,224,224
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,224
950 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0
960 DATA 0,0,0,0,0,0,0,0,0,224,224,224,2
24,224,224,224,224,224,224,224,224,224,2
24,224,224
970 DATA 229,229,229,229,229,229,229,229,2
29,229,229,229,229,229,229,229,229,229,0
,0,0,0,0,0,0
980 DATA 0,0,0,0,0,0,0,0,0,229,229,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,229
990 DATA 229,0,0,0,0,229,229,229,229,2
29,229,229,229,229,0,229,0,0,0,0,229,229
,0,0
1000 DATA 0,0,229,0,229,229,0,229,0,0,0
,229,229,0,0,0,0,0,0,0,0,229,0,229
1010 DATA 0,0,229,229,0,0,0,0,0,0,0,0,0
,229,0,229,229,229,229,0,0,0,229,229
1020 DATA 229,0,0,0,0,229,0,229,224,0,0
,0,0,0,0,0,0,0,0,0,0,229,0,229
1030 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0,0,2
29,0,229,224,0,0,0,0,0,0
1040 DATA 0,0,229,229,0,229,0,229,224,0
,0,229,0,229,0,0,0,0,0,229,229,229,0,229
1050 DATA 224,0,0,229,0,229,0,0,0,0,0,0
,229,229,0,229,225,225,225,225,0,225,225
,225
1060 DATA 225,225,0,0,0,229,0,229,225,0
,0,0,0,0,0,0,0,225,225,0,0,0,0,229
1070 DATA 225,0,0,0,0,0,0,0,0,0,225,225
,0,0,0,0,229,225,0,0,0,0,0
1080 DATA 0,0,0,225,225,225,225,225,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0
1090 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,229,229,229,229,229,229,229,229
1100 DATA 229,229,229,229,229,229,229,2
29,230,226,230,226,230,226,230,226,230,2
26,230,225,0,225,225,225
1110 DATA 226,0,224,0,0,0,0,0,0,0,0,225
,0,0,225,225,230,0,224,0,0,0,0,0
1120 DATA 0,0,0,225,0,0,225,225,226,0,0
,0,0,0,0,0,0,0,0,225,0,0,0,225
1130 DATA 230,0,0,0,0,0,0,0,224,224,0,2
25,225,0,0,225,226,0,0,0,0,0,0,0
1140 DATA 0,0,0,225,225,0,0,225,230,224
,224,0,0,224,224,0,0,0,0,225,0,0,225
1150 DATA 226,0,0,0,0,0,0,0,0,0,0,0,225,0
,0,225,225,230,0,0,0,0,0,0
1160 DATA 0,224,224,225,0,0,0,225,226,0
,0,0,0,0,0,0,0,0,225,225,0,0,225
1170 DATA 230,0,0,224,224,0,0,0,224,224,0
,0,225,0,0,0,225,226,0,0,0,0,0,0
1180 DATA 0,0,0,225,0,0,225,225,230,0,0
```

```
,0,0,0,0,0,0,0,0,225,0,0,0,225
1190 DATA 226,0,0,0,0,0,0,0,0,0,225,2
25,0,0,225,230,0,0,0,0,224,224,0
1200 DATA 0,0,0,225,0,0,0,225,226,0,0,0
,0,0,0,0,0,0,0,0,225,0,0,225,225
1210 DATA 230,0,0,0,0,0,0,0,0,0,225,0
,0,0,225,0,0,0,224,224,0,0,224
1220 DATA 224,0,0,225,225,0,0,225,0,0,0
,0,0,0,0,0,0,0,225,225,0,0,225
1230 DATA 67,111,110,115,116,114,117,99
,116,105,111,110,225,225,0,225,83,116,10
1,112,112,105,110,103
1240 DATA 229,83,116,111,110,101,115,22
9,224,0,0,0,0,0,0,0,0,0,0,224,224,224,
224
1250 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,224,0,0,0,0,0,0,0
1260 DATA 0,0,0,0,0,0,0,0,0,224,225,225,0
,0,0,0,0,0,0,0,0,224,224,0,0
1270 DATA 224,0,0,0,0,0,0,0,0,0,224,2
24,224,0,0,224,0,0,0,0,0,0,226
1280 DATA 0,0,0,224,0,224,0,0,224,0,0,2
26,0,0,0,0,0,0,0,224,224,0,224,0,0
1290 DATA 224,0,0,0,0,0,0,0,0,0,224,0,0
,224,0,0,224,0,0,0,0,0,0
1300 DATA 0,0,0,0,0,224,0,0,224,0,0,0,0
,226,0,0,0,0,0,0,0,224,0,0
1310 DATA 224,0,0,0,0,0,0,0,0,0,0,0,2
24,0,0,224,0,0,0,0,0,0,0
1320 DATA 0,0,0,0,0,224,0,0,224,0,0,0,0
,0,0,226,0,0,0,0,0,224,224,224
1330 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,224,0,0,0,0,0,0,0
1340 DATA 0,0,226,0,0,0,0,0,224,0,225,0
,0,0,0,0,0,0,0,0,0,224,224,224
1350 DATA 224,0,225,225,0,0,0,0,0,0,0,0
,0,224,0,0,224,0,225,225,225,0,0,0
1360 DATA 0,0,0,0,0,224,0,0,224,224,224
,224,224,224,224,224,224,0,224,224,224,2
24,0,0
1370 DATA 224,224,224,224,224,224,224,2
24,224,224,224,224,224,224,224,229,0
,0,0,0,0,0,0
1380 DATA 0,0,0,0,0,0,0,0,225,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,225
1390 DATA 0,0,0,0,0,229,229,229,229,229
,229,229,229,225,0,225,0,0,0,0,0,0
1400 DATA 0,0,0,0,0,225,0,225,0,0,0,0,0
,0,0,0,0,0,0,0,0,225,0,225
1410 DATA 0,0,229,229,0,0,0,0,0,0,0,0
,225,0,225,0,0,0,0,0,0,0
1420 DATA 0,0,0,0,0,225,0,225,0,0,0,0,0
,0,0,0,0,0,0,0,0,225,0,225
1430 DATA 0,0,0,0,0,225,225,0,0,0,0,0,0
,225,0,225,0,0,0,0,0,0,0,0
1440 DATA 0,0,0,0,0,0,225,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,225
1450 DATA 0,0,0,0,0,0,225,225,0,0,0,0
,225,225,225,224,224,0,0,0,0,0
1460 DATA 0,0,0,0,0,0,225,0,225,0,0,0,0
,0,0,0,0,0,0,225,225,225,0,225
1470 DATA 0,0,0,0,0,0,0,0,0,0,0,0,225
,0,225,224,224,224,224,0,0,0,0
1480 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0
1490 DATA 0,0,0,0,0,0,0,0,225,225,0,0,0
,0,0,0,0,224,224,224,224,224,224,224
1500 DATA 224,224,224,224,224,224,224,2
24,224,224,224,224,224,224,224,224,2
24,224,224,224,224,224,224
1510 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,230,224,0,0,0,0,0,0,0
1520 DATA 0,0,0,0,0,0,0,0,229,224,0,0,0
,0,0,0,0,0,0,0,0,0,0,230
1530 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,229,224,0,0,0,0,0,0,0
```

```
1540 DATA 0,0,0,0,0,0,0,230,224,0,0,224
,224,224,224,224,0,0,0,229,229,229,229,2
29
1550 DATA 224,0,0,0,0,0,0,0,0,0,0,0,0
,0,230,224,0,0,0,0,0,0,0
1560 DATA 0,0,0,0,0,0,0,229,224,224,0,0
,0,0,0,0,0,0,0,0,0,0,0,0
1570 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0
1580 DATA 0,0,230,230,230,230,230,230,0
,0,0,229,229,0,0,0,0,0,230,0,230,0,229
1590 DATA 0,0,0,0,0,0,0,0,0,0,0,230,0,2
30,0,230,0,0,0,0,0,0,229
1600 DATA 229,0,0,230,0,0,0,229,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,230
1610 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0
,229,0,0,0,0,0,0,0,0
1620 DATA 0,0,0,0,0,0,0,0,230,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,229
1630 DATA 224,224,224,224,224,224,224,2
24,224,224,224,224,224,224,224,225,2
29,224,229,224,229,224,229
1640 DATA 224,229,224,229,224,229,224,2
29,225,0,0,0,0,0,0,0,0,0,0,0,0,229
1650 DATA 225,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,229,225,0,0,0,0,0,0,0
1660 DATA 0,0,0,0,0,0,0,229,225,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,229
1670 DATA 225,224,224,224,0,0,224,224,2
24,224,0,0,224,224,224,229,225,0,0,0,0
,0,0
1680 DATA 0,224,0,0,0,0,0,229,225,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,229
1690 DATA 225,0,229,229,229,229,0,0,0,0
,0,0,229,229,229,229,0,0,0,0,0,229,0,0
1700 DATA 0,0,0,0,0,0,0,229,0,0,0,0,0,2
29,0,0,0,0,0,0,0,0,0,229
1710 DATA 225,229,229,229,0,229,229,229
,229,229,229,229,229,229,229,225,0,0
,229,0,229,0,0
1720 DATA 0,0,0,0,0,0,0,229,225,0,0,229
,0,229,0,0,0,0,0,0,0,0,0,229
1730 DATA 225,0,0,229,0,229,0,0,0,0,0,0
,0,0,0,229,225,0,0,0,0,0,0,0
1740 DATA 0,0,0,224,224,224,0,229,225,0
,0,0,0,0,0,0,0,0,224,0,224,0,229
1750 DATA 225,0,0,0,0,0,0,0,0,0,224,0
,224,0,229,225,0,0,0,0,0,0,0
1760 DATA 0,0,0,224,0,224,0,229,229,229
,229,229,84,104,101,229,86,101,114,121,0
,69,110,100
1770 DATA 0,0,0,0,255,5,0,0,0,0,255,5,0
,0,0,0,255,10,0,0,0,0,255,255
1780 DATA 0,0,0,0,255,255,2,28,17,17,8,
3,0,0,0,0,255,255,0,0,0,0,0,255,5
1790 DATA 0,0,0,0,255,255,0,0,0,255,255
,0,4,4,4,18,5,4,8,8,6,18,5,2
1800 DATA 12,12,8,17,6,6,0,0,0,0,255,16
,0,0,0,0,255,0,0,0,0,0,255,0
1810 DATA 16,16,9,16,10,5,0,0,0,0,255,0
,0,0,0,0,255,0,0,0,0,0,255,0
1820 DATA 0,0,0,0,255,3,0,0,0,0,255,5,0
,0,2,10,6,2,30,30,2,10,6,2
1830 DATA 0,0,0,0,255,0,2,28,13,13,7,4,
0,0,0,0,255,5,0,0,0,0,255,5
1840 DATA 0,0,0,0,255,0,0,0,0,0,255,5,6
,28,13,13,5,3,6,28,14,14,4,2
1850 DATA 0,0,0,0,255,0,0,0,0,0,255,5,0
,0,0,0,255,5,0,0,0,0,255,5
1860 DATA 0,0,0,0,255,0,6,27,15,15,11,3
,0,0,0,0,255,5,0,0,0,255,255,5
1870 DATA 0,0,0,0,255,0,0,0,0,0,255,0,0
,0,0,0,255,0,0,0,0,0,255,0
1880 DATA 0,0,0,0,0,0,255,0,0,0,0,0,255,0
,0,0,0,255,0,0,0,0,0,255,0
1890 DATA 23,23,6,16,9,7,0,0,0,0,255,4,
```


PROGRAMMING: BBC

```

0,0,0,0,255,0,0,0,0,0,255,0
1900 DATA 0,0,0,0,255,0,0,0,0,0,255,0,0
,0,0,0,255,0,0,0,0,0,255,0
1910 DATA 0,0,0,0,255,0,0,0,0,0,255,0,0
,0,0,0,255,0,0,0,0,0,255,0
1920 DATA 0,0,0,0,255,0,0,0,0,0,255,0,0
,0,0,0,255,5,0,0,0,0,255,5
1930 DATA 0,0,0,0,255,0,0,0,0,0,255,5,0
,0,0,0,255,5,0,0,0,0,255,5
1940 DATA 0,0,0,0,255,0,0,0,0,0,255,5,2
,16,3,3,5,5,0,0,0,0,255,4
1950 DATA 0,0,0,0,255,5,0,0,0,0,255,5,0
,0,0,0,255,5,0,0,0,0,255,5
1960 DATA 0,0,0,0,255,0,2,20,8,8,11,3,0
,0,0,0,255,5,0,0,0,0,255,5
1970 DATA 12,12,2,18,4,2,0,0,0,0,255,5,
8,8,2,16,6,3,0,0,0,0,255,5
1980 DATA 0,0,0,0,255,0,0,0,0,0,255,5,2
,2,6,16,10,7,0,0,0,0,255,5
1990 DATA 0,0,0,0,255,0,0,0,0,0,255,5,0
,0,0,0,255,5,2,28,2,4,3
2000 DATA 0,0,0,0,255,0,0,0,0,0,255,5,0
,0,0,0,255,5,0,0,0,0,255,5
2010 DATA 0,0,0,0,255,5,0,0,0,0,255,5,0
,0,0,0,255,5,0,0,0,0,255,5
2020 DATA 0,0,0,0,255,0,0,0,0,0,255,5,0
,0,0,0,255,5,0,0,0,0,255,5
2030 DATA 0,0,0,0,255,0,0,0,0,0,255,5,1
8,18,2,16,10,2,2,26,17,17,11,2
2040 DATA 0,0,0,0,255,0,0,0,0,0,255,5,0
,0,0,0,255,0,0,0,0,0,255,0
2050 DATA 0,0,0,0,255,5,0,0,0,0,255,5,0
,0,0,0,255,5,0,0,0,0,255,5
2060 DATA 0,0,0,0,255,5,0,0,0,0,255,5,2
,27,1,1,9,3,2,20,15,15,9,3,0,177,112
>

```

```

1REM MAGIC MAZE by M Weatherill
2REM ** Listing 3 **
10REM SPRITES DATA 900-A80
11REM poke and save as a block of RAM
20 RESTORE:C%=0
30 FORQ%=&900 TO &A80
40 READ A$:Z%=EVAL("&"+A$)
51 C%=C%+Z%:?Q%=Z%:NEXT

```

```

61 IFC%(<)&86F0 VDU7:PRINT"ERROR IN DA
TA":END
70 PRINT"Ready to save sprite data"
80 PRINT"PRESS A KEY":REPEATUNTILGET
90 *SAVE sprdata 900 A80
1000 DATA 10,30,70,60,F0,0,70,30,3,7,7,
F
1010 DATA 70,11,11,33,80,C0,E0,E0,F0,E0
,E0,C0
1020 DATA C,E,E,F,E0,44,77,11,10,30,70,
60
1030 DATA F0,0,70,30,3,7,7,F,70,11,22,6
6
1040 DATA 80,C0,E0,E0,F0,E0,E0,C,E,E
,F
1050 DATA E0,44,44,CC,10,30,70,70,F0,70
,70,30
1060 DATA 3,7,7,F,70,22,EE,88,80,C0,E0,
60
1070 DATA F0,0,E0,C0,C,E,E,F,E0,88,88,C
C
1080 DATA 10,30,70,70,F0,70,70,30,3,7,7
,F
1090 DATA 70,22,22,33,80,C0,E0,60,F0,0,
E0,C0
1100 DATA C,E,E,F,E0,44,22,33,C,B,2A,8
1110 DATA 14,4,9,E,3,D,45,1,82,2,9,7
1120 DATA 99,67,32,CF,74,47,BC,FF,99,E6
,4C,F7
1130 DATA 2E,E2,3D,FF,66,FF,FF,FF,FF,FF
,FF,FF
1140 DATA FF,66,0,0,66,FF,FF,0,30,70,E0
,C0
1150 DATA C0,40,0,0,10,10,10,0,0,10,10,
10
1160 DATA C0,E0,70,30,30,30,60,E0,C0,80
,80,0
1170 DATA 0,80,80,80,A,4,28,20,9,9,4,B
1180 DATA A,5,A,5,2,1,2,D,A,1,41,41
1190 DATA 1,A,3,D,A,1,8,1,8,5,A,9
1200 DATA 66,9F,AE,AE,AE,AE,AE,AE,AE,57
,57,47
1210 DATA 47,8F,8F,8F,47,47,47,47,23,23
,23,11

```

```

1220 DATA 0,0,0,0,0,66,9F,8F,8F,F,F,6
1230 DATA 96,6,F,69,90,F0,F,F,F,6F,99,8
8
1240 DATA 66,9F,57,57,57,57,57,9F,9F,DF
,2E,2E
1250 DATA 2E,2E,1F,1F,1F,1F,1F,1F,2E,2E
,2E,CC
1260 DATA 40,A0,A0,A0,A0,90,50,50,50,90
,90,A0
1270 DATA A0,90,90,50,50,50,90,A0,A0,A0
,A0,40
1280 DATA F0,0,0,0,0,0,0,0,0,30,70
1290 DATA 87,70,30,22,6,F,F0,F0,3F,F0,F
0,99
1300 DATA 0,0,C0,E0,3E,E0,C0,44,18,69,4
0,85
1310 DATA 70,AD,39,4,16,0,0,16,12,11,FE
,7,0
>
10REM MAGIC MAZE by M Weatherill
11REM ** Listing 4 **
20REM OBJECT DATA 5600-5680
30REM poke and save as block of RAM
40 RESTORE:C%=0
50 FORQ%=&5600 TO &5680
60 READ Z%:C%=C%+Z%
70 ?Q%=Z%:NEXT
80 IFC%(<)&86D VDU7:PRINT"ERROR IN DAT
A":END
90 PRINT"Ready to save objdata"
100 PRINT"PRESS A KEY":REPEATUNTILGET
110 *SAVE objdata 5600 5680
120
130 DATA 13,14,13,9,1,9,15,11,3,5,6,7,
11,12,14,1,14,6,3,7,7,7,1
140 DATA 13,14,14,14,3,6,12,10,7,6,14,
10,8,6,10,1,1,1,12,14,14,1,13
150 DATA 4,2,14,12,10,14,6,12,1,1,14,9
,13,10,18,4,14,1,6,16,1,1,6,15
160 DATA 11,11,11,6,18,1,1,18,8,11,14,
1,18,18,14,9,2,18,5,5,4,8,15,18
170 DATA 16,1,1,1,1,18,18,15,12,13,1,2
,18,15,12,12,1,18,16,18,1,1,10
180 DATA 13,255,255,255,1,9,15,255,3

```

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Screen Grid

Keith Irving

This routine for the Spectrum sets up a grid system on the screen by setting bytes in the attribute file to Bright. The machine code is poked into the printer buffer at 232967. Address 23313 is set to 11 for the routine to work on the top

22 lines of the screen. For a whole screen grid poke 12 into this address. To turn the grid on enter *POKE 23326,246:RANDOMIZE USR 23296* and to turn it off again *POKE 23326,182:RANDOMIZE USR 23296*.

```
10 REM POKE "GRID" CODE INTO PRINTER BUFFER
20 FOR N=23296 TO 23296+35
30 READ X: POKE N,X: NEXT N
40 DATA 17, 32, 0, 33, 0, 88, 205, 16, 91, 33, 33, 88, 205, 16,
    91, 201, 6, 11, 197, 205, 27, 91, 25, 193, 16, 248,
    201, 6, 16, 203, 246, 35, 35, 16, 250, 201
50 POKE 23326,246: RANDOMIZE USR 23296
60 STOP
```

Fill Patterns

Darryn Lavery

Gem allows programmers to design their own fill patterns. The following Atari ST program illustrates this.

The data for this is contained in 16 words (16 bit) and is poked into the *Intin* array. To access your fill pattern enter - *Color 1,1,1,1,4*. The first three parameters do not matter.

```
5      FULLW 2: CLEARW 2
10     REM USER DEFINED FILL PATTERNS BY DARRYN LAVERY
20     POKE CONTRL,112: POKE CONTRL+2,0: POKE CONTRL+6,16
30     FOR T=0 TO 15: READ X: POKE INTIN+(2*T),X: NEXT
40     VDISYS(1)
50     COLOR 1,1,1,1,4
60     PCIRCLE 100,80,50
70     END
10000  REM FILL PATTERN DATA HERE
10010  DATA 0,0,0,0
10020  DATA 50046,50046,49944,65304
10030  DATA 65304,49944,50046,50046
10040  DATA 0,0,0,0
```

Alert Boxes

Darryn Lavery

Alert boxes are available under Gem to get confirmation of an action by the user. Using *Basic* on the Atari ST you can implement Alert boxes. Enter. *A\$="[alert type] [main text] [btext1: btext2: btext3]" GOSUB ALERT*

Alert type can be nothing (0), exclamation (1), question mark (2) or stop (3). *Btext* is the message on each button, up to three buttons, eight characters each.

The option chosen will be returned in the variable *RESULT*.

```
5      FULLW 2: CLEARW 2
10     REM ST ALERT BT DARRYN LAVERY
20     A$="[1][Popular Computing is...
    ][alright|wonderful| 60p]"
30     BUTTON=1
40     GOSUB ALERT
50     PRINT"YOU PRESSED OPTION ";RESU
LT
60     END
10000  ALERT: Z=VARPTR(A$): Z1=INT(Z/655
36): Z2=Z-(Z1*65536)
10010  A#=GB: CONTROL=PEEK(A#): GINTIN=P
EEK(A#+8): GINTOUT=PEEK(A#+12)
10020  ADDRIN=PEEK(A#+16): POKE CONTROL
,52: POKE CONTROL+2,1: POKE CONTROL+4,1
10030  POKE CONTROL+8,1: POKE CONTROL+1
0,0: POKE GINTIN,BUTTON
10040  POKE ADDRIN,Z1: POKE ADDRIN+2,Z2
: GEMSYS(52)
10050  RESULT=PEEK(GINTOUT): RETURN
```


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Commands and Functions in C

Kenn Garroch continues his series on programming in C with an in-depth look at the libraries of predefined commands found in most C packages.

One of the design features of the C programming language is that it has a relatively small number of built in commands and functions. C's flexibility, however, gets around this possible drawback with libraries of predefined commands.

The most common of these is *stdio.lib* which is included in almost every C package. This library and its complementary header file contain all sorts of goodies that would take a good deal of time and effort to program from scratch.

The contents of the *stdio* are generally quite standardised and based on the Unix system developed at Bell Labs. Some systems will have a few changes and differences but in general, these will be included in an alternative library file for use with a specific machine.

The library *stdio* usually comes in two sections: the header, which contains a series of definitions such as true and false (1 and 0), external variable and constant definitions (these are global, ie, available to the main program and the functions), and other things needed by the *stdio.lib* file such as machine code definitions.

This latter file contains all of the standard additional commands to cope with things such as string handling, input output and file handling, additional arithmetic routines, and other assorted oddments. Among these oddments is usually a quicksort routine.

A library file is included in a C program with the `#include` command for example:

```
#include stdio.h
main()

char line[20];
gets(line);
puts(line);

#include stdio.lib
```

This program shows the use of the string *get* and *put* commands available in the library *stdio.lib*. Some versions of C may not work in exactly this way, and you may have

to check your manual to see how libraries are added to programs.

There are a couple of points about the above program that should be made clear. Firstly, the character array line [20] is what C uses for string storage. Once this is defined, *line*, by itself, is a pointer to the start of the array. This means that it returns a number that is the address of the first character in the array.

Pointers are very useful in C, especially with array handling. A pointer is defined by

preceding the variable name with an asterisk (*), eg, *char *cp*; defines *cp* to be a character pointer, ie, a variable that holds the address of a memory location where the character value is kept.

In fact, a pointer is a good example of indirect addressing. The name of the pointer gives the address of the pointer. In turn, the value at this address is the address of the thing to be pointed at.

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PROGRAMMING FEATURE

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This may sound complicated but it isn't really. The only oddity is that array names are pointers and are not preceded by a *. For instance, the following program gets a line of text from the keyboard, and then prints it out a character at a time to the screen.

```
#include stdio.h
main()

char line[20], *cp;
cp=line;
gets(cp);
while (*cp !=0)

    putchar(*cp++);
    putchar('\n');

#include stdio.lib
```

Here, the *char* pointer *cp* is set up along with the array *line* [20] and then set equal to it. The *gets* function then reads the keyboard and puts all the characters up to the carriage return into memory starting at the address pointed to by *cp*. At the end of the line, a zero is automatically placed in the array. This is the standard string terminator used in C.

The *while* then loops, while the byte pointed to by *cp* is non-zero. The function *putchar* is used to output a single value found, via the pointer *cp*, which is incremented after use with the ++ command. \n prints a newline character so that each letter is printed on a new line. *putchar* actually deals in numbers and not values. The single quotes enclosing \n turn it into a carriage return number.

The great advantage of pointers is that they can be assigned to any string so passing arrays into functions can be done without having to specify any one array, just

"A pointer is a good example of indirect addressing. The name of the pointer gives the address of the pointer, and that value is the address of the thing pointed at"

a pointer to the array to be used. So, a function can be defined as follows:

```
down(string)
char *string;

while(*string !=0)

    putchar(*string++);
    putchar('\n');
```

The definition of **string* outside the body of the function allows it to be a pointer to the argument string, without being a duplicate definition. *down* can be used in two ways, either *down(line)* where *line* is an array name, or *down(cp)* where *cp* is a character pointer.

One last point to note about character arrays is that their lengths are not checked. This means that if more characters are placed into it then it will hold, the memory will begin to be corrupted. This can cause the program to crash, sometimes quite spectacularly, so take care.

Getting back to the library, the string handling routines all use pointers to string arrays (this is the same as the array name itself – it is merely a more accurate description). Look in your manual to see which commands are included in the library. The following example shows string concatenation (addition) in action.

```
#include stdio.h
main()

char line1[10], line2[10], *cp;
gets(line 1);
gets(line 2);
cp=strcat(line1, line2);
puts(cp);
```

The function *strcat* returns the address of the start of the string in the array *line one* which is actually *line one* itself. It should be possible to work out how all the string functions operate, from the manual. If you want to examine and/or add to the libraries you have, simply load them into the editor and root around. The libraries provide good programming examples and should help you understand how C functions are put together to perform virtually any command.

Selected C compilers

Program HiSoft C Micro Spectrum
Price £25.00 **Supplier** HiSoft, The Old School, Greenfield, Bedford MK45 5DE (0525 78181).

Program HiSoft C Micro Any CP/M Z80 based system, eg, Amstrad with disc drive
Price £39.95 **Supplier** HiSoft, address as above.

Program Lattice C Compiler Micro Atari ST
Price £99.95 **Supplier** Metacomco, 26 Portland Square, Bristol BS2 8RZ (0272 428781).

Program Megamax C Micro Atari ST
Price £157.55 **Supplier** Selected Atari dealers, including Silica Shop, 1-4 The Mews, Hatherley Road, Sidcup, Kent DA14 4DX (01-309 0300).

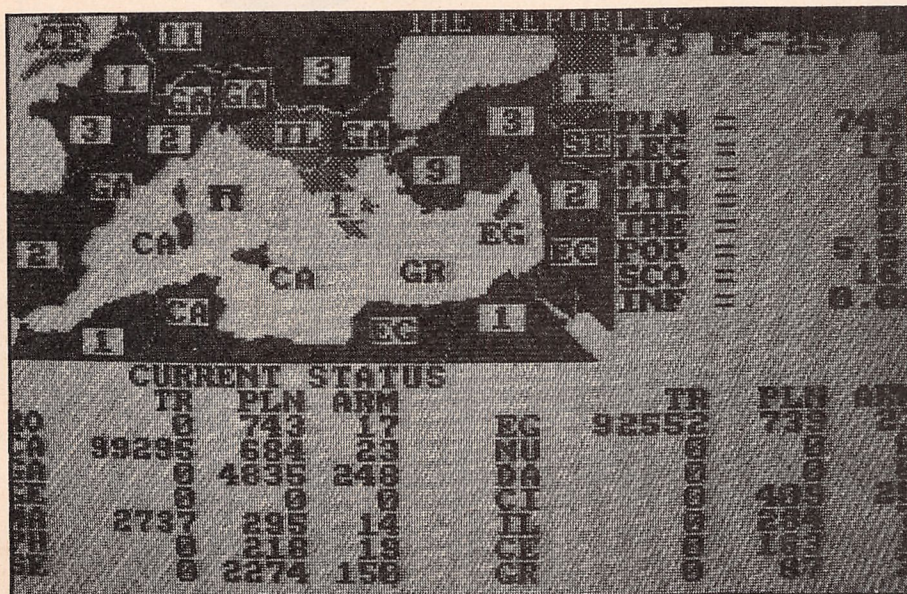
Program GST C Compiler Micro Atari ST
Price £59.00 **Supplier** Electric Software, Unit 8, Cromwell Business Centre, New Road, St Ives, Cambs (0480 66433).

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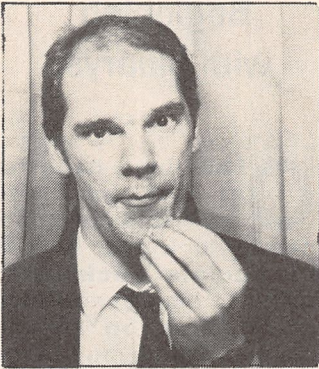
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Program Lattice C Compiler Micro Commodore Amiga
Price £129.95 **Supplier** Metacomco, address as above.

Program Super C Micro Commodore 64
Price £44.95 **Supplier** Precision Software, 6 Park Terrace, Worcester Park, Surrey KT4 7JZ.



PSS's Annals of Rome was programmed in C.



with Kenn Garroch

Stand corrected on TI99/4A

Ian James, of Bedworth, Warks, writes:

Q A couple of weeks ago, a Mr Hopkins wrote to you concerning the TI99/4A computer which had been given to him but would not work.

Your reply, if you don't mind me saying so, was both incorrect and misleading. I thought you would have been inundated with replies but as I have seen nothing in the next two issues of *Popular*, I thought I would write to you.

The TI99/4A has a perfectly good Basic language built into its Ram; there is no need for a cartridge in the front to make it work. The title screen should come on immediately the computer is switched on, and pressing a key then puts you into Basic.

If the TV screen just comes on in one colour, I would suspect the connections between the console and the external modulator lead to the TV – possibly a broken connection at the 6 pin Din plug.

There are two thriving TI user groups in the country and Mr Hopkins is fortunate in living in the West Midlands, as there are workshop days held two or three times a year at Bloxwich. The next one is planned for July 5. Contact Gordon Pitt on 0922 476373. There is also a TI user fair at Derby on May 16, contact Clive Scally

for details on 0273 503968.

I hope that Mr Hopkins is able to get his computer to work, and join one or both of the user groups.

A I did have a few replies suggesting that I was completely wrong, even though I was as circumspect as possible. Your letter is the most informative yet and, hopefully, covers all the angles.

Facing the Discovery

Sean L'Estrange, of Co Westmeath, Ireland, writes:

Q When my Multiface 128 is connected to my Spectrum 128 and Discovery 1 disc drive via an extension cable, the Discovery does not work properly. All reading commands produce an error. This does not happen when no extension cable is used, but I have to take the keyboard cover off to attach them in this way.

The cable is not at fault since it works fine without the Multiface. I have also tried a brand new cable with the same results. Please can you or any of your readers help me?

A It appears that using the Multiface with an extension cable alters the transmission characteristics of the cable, probably because the Multiface does not terminate the cable properly, or the load on the Spectrum's port is too much. When you connect the disc drive as well, the change in characteristics or load causes errors in the data coming from the drive.

I am no expert on the Discovery or the Multiface but, is there an extension of the Spectrum's port on the back of the Discovery, ie, to connect the extension, the Discovery, and then the Multiface. If you cannot do

this then, unfortunately, you are stuck with having to take the keyboard off unless someone makes a line driver for the Spectrum's user port or perhaps one of *Popular*'s readers has solved this problem? If so, please write to Peek and Poke with the solution.

Break out on Commodore

Richard Teesdale, of Olney, Bucks, writes:

Q I am currently trying to write a *Breakout* in machine code for the Commodore 64. I have no intention of trying to sell it – it's just to see whether I can do it as I haven't used machine code before.

Firstly, your routine for checking the screen position of a sprite from *Popular*, April 10, has helped me immensely, as that was one of the problems. As it stands, however, I don't think the look up table for multiplying the Y position will work because it would need two bytes for the larger Y numbers.

However, my main reason for writing to you is to ask your advice about a problem I've encountered with collision detection of a sprite. As it stands, my program should BRK to a monitor as soon as the ball hits a block. Since the sprites are only moving one pixel at a time and the collision detection register is checked after each pixel movement, the program should stop after the sprite has penetrated one pixel into the block. However, it only does this sometimes in fact, the faster I run the program, the more the ball penetrates the blocks before collision is detected.

This problem has really stumped me. I feel sure it

has something to do with the speed that the screen is updated but, I can't for the life of me work out the solution.

A Whoops, you are quite right, the sprite positioning routine in the April 10 issue does need two bytes for the Y values since, as it stands, only the first 25 positions are covered. On looking at the problem again, the formula

mem loc = base + ((x-28)/8)+((y-54)/8)*40)

is really the one that should be used so, the look up table now becomes times 40. If a times five table were used, it would have to be rather large, ie, 200*2 entries. The times 40 table is a compromise that makes the program a little slower but saves space for the table. The altered program is shown below.

```

TI#40  BYTE 0,0,40,0,80,0,120,0,160,0,200,0,240,0,24,
      1,64,1,104,1
      BYTE 144,1,184,1,224,1,8,2,48,2,88,2,128,2,
      168,2,208,2
      BYTE 248,2,32,3,72,3,112,3,152,3,192,3
      XPSL  BYTE 0
      XPSH  BYTE 0 ; Two byte x pos of sprite
      YPOS  BYTE 0 ; Y pos of sprite
      TTL   =SFC
      TTH   =SFC
      FCHAR  LDA XPSL ; Get x position of sprite
      SEC
      SBC #28 ; Sub 28
      STA TTL
      LDA XPSH
      SBC #0
      STA TTH
      CLC
      LSR TTH ; Divide by 2
      ROR TTL ; Divide by 2
      LSR TTH
      ROR TTL ; Divide by 2 total div 8
      LSR TTH ; Divide by 2 total div 8
      LDA YPOS ; Get y position
      SEC
      SBC #54 ; Sub 54
      LSR A ; divided by 8
      LSR A ; actually 4 then times 2 for lookup
      AND 254 ; ((Y-54)/8)*2
      TAX
      LDA TI#40,X ; Look up times 40 low value
      CLC
      ADC TTL ; Add to current total
      STA TTL
      LDA TI#40+1,X ; Times 40 high value
      ADC TTH
      STA TTH
      STA *BASE ; Screen base address norm 1024
      CLC
      ADC TTL ; Add to total
      LDA *BASE ; Hi byte of address
      ADC TTH ; Add with carry to total
      STA TTH
      LDY #0
      LDA (TTL),Y ; Read character from screen to accum
      RTS
    
```

The problem you are having with collisions is due, as you say, to the screen update speed. Collisions are only detected when the screen raster scan actually crosses them. Since the screen is only updated every 1/25 of a second, and your program is probably moving the sprite more often than this, collisions are hard to detect.

The thing to notice is that if the sprites are moving faster than the screen is refreshing, then some of the positions will not be seen since it is possible for the sprite to have moved two or more places in the time it

continued on page 38 ►

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem Peek it to Kenn Garroch and every week he will Poke back as many answers as he can. The address is Peek & Poke, PCW, 12-13 Little Newport Street, London WC2H 7PP.

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takes for the screen to complete a scan.

Bearing this in mind, the best thing to do is slow the program down and speed the sprites up by moving them two pixels at a time. As long as the program is not updating the sprites faster than the screen is refreshing, collisions will be detected accurately. The only drawback is that the ball will have penetrated the UDG by two pixels before the collision is noted.

There is not really a lot you can do about this except improve the time taken to remove the brick and reverse the direction of the ball so that large penetrations are less noticeable.

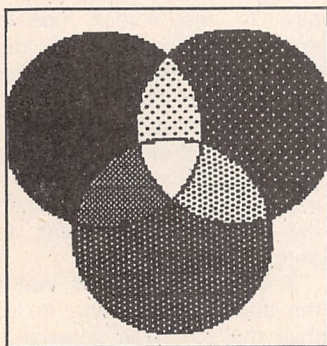
Another possible solution is not to use the sprite data collision detection at all. It may be faster to use the UDG/sprite position program (below) to check if there is a brick under the sprite. You may need to alter it so that the edges of the sprite are checked and not the centre. In this situation, you are not relying on the screen refresh, all the information you need is in the Ram, all you need to do is look in the right place.

Running around in circles

Vincent Li, of Pudsey, West Yorks, writes:

I own a BBC B computer and I am trying to write a Basic program using graphics, but I have come across a problem.

When trying to draw three circles overlapping, I don't know how to fill the seven different parts with seven different colours.



I would also like to know if more than eight colours can be obtained on the BBC.

Finally, could you please tell me which of the following computers is better (speed, graphics, software): The Amstrad 1512 or the BBC Master?

A The BBC micro has a built-in semi-fill command, PLOT 72-79. This starts at the X,Y position and draws to the left until it finds a different colour, then draws right until the colour changes giving a line fill.

To make this work as a proper fill, you need to include a little programming to move the fill up and down to encompass the whole object. The fill program shown below should do your circles for you.

```
5 REM FILL FOR BBC
10 MODE 2
20 PROC3
30 FOR T=1 TO 12
40 READ X,Y,C
50 PROC FILL(X,Y,C)
60 NEXT
70 END
80 DATA 300,600,1,240,420,1,600,600,2,660,420,2
90 DATA 450,400,4,440,604,3,470,604,3,580,420,6
100 DATA 510,550,6,300,500,5,380,580,5,450,500,7
120 DEFPROC(X,Y,R)
130 MOVE X,Y-R
140 FOR T=0 TO 2*PI+.1 STEP .1
150 DRAW SIN(T)*R*X,COS(T)*R*Y
160 NEXT
170 ENDPROC
180 DEFPROC3
190 PROC(300,600,200)
200 PROC(600,600,200)
210 PROC(450,400,200)
220 ENDPROC
230 DEFPROC FILL(X,Y,C)
240 GCOL 0,C
250 FX=X:FY=Y
260 PLOT 77,FX,FY
270 FV=FY-4
280 IF POINT(FX,FY)>0 THEN 290 ELSE 260
290 FX=X:FY=FV+4
300 PLOT 77,FX,FY
310 FV=FV+4
320 IF POINT(FX,FY)>0 THEN 330 ELSE 300
330 ENDPROC
```

The only problem with PROC-FILL is that if there are unusual shapes to be filled, it needs to be used a number of times to fill the whole area. When it scans upward and downward, it does so in a straight line so, if it meets an edge, it will stop.

A more sophisticated routine is needed to fill any shaped objects but as it stands, it is reasonably fast and if you pick the starting positions correctly, it will fill most shapes in two or three goes.

Eight colours are the theoretical maximum on the BBC and all of these are only available in mode 2. This is actually a 16 colour mode however, with eight colours being flashing versions of the first eight. To get more colours, you will need to mix the existing colours. The effectiveness of this depends on the resolution of your monitor/TV. If the picture is a little fuzzy, then the colours mix better.

To see 64 colours, use the 64 colour demo program. This draws a grid of alternately coloured dots and then changes the colours through every combination. Some of these are obviously a grid of dots, other blend quite well to produce some good colour shades. You could experiment with using more colours in the grid, ie, try a four colour grid in mode 2, but this does produce very grainy results.

```
5 REM 64 COLOUR DEMO
10 MODE 1
20 DX=1
30 XS=0:YS=0
40 X=XS:Y=YS
50 GCOL 0,1
60 PLOT 69,X*4,Y*4
70 X=X+1
80 GCOL 0,2
90 PLOT 69,X*4,Y*4
100 X=X+1
110 IF X<130 THEN 50
120 XS=XS-DX:DX=-DX
130 YS=YS+1
140 IF YS<140
    THEN 40
150 FOR T=0 TO 7
160 FOR S=0 TO 7
170 VDU 19,1,T,0,0,
    0,0
180 VDU 19,2,S,0,0,
    0,0
190 A$=GET$
200 NEXT: NEXT
```

Your last point is a little more difficult to answer since the two machines are quite different in a lot of ways. Which one is better depends very much on what you want to use it for. There is really no question about the fact that Amstrad's PC clone, has more software available and for some things, maybe a little faster. Its graphics are not, however, quite as good as the BBC Master's (This is a matter of opinion, mine in this case), and neither is its keyboard. Its disc handling system is almost certainly slower than the Master, but then, it is quite sophisticated.

These days, there is probably far more support for the PC clone machines than for any other so, of a choice between the two, if I couldn't have both, I suppose I'd have to go for the Amstrad.

Beginning with binarys

L Flanery of Coventry, writes:

I am just a beginner at 6502 machine code and have become stuck over how to manipulate decimal figures in binary, and then print them on to the screen. Could you tell me how this is done?

A The trick, when using decimal figures in machine code, is to use a type of storage known as Binary Coded Decimal, or BCD. Almost all microprocessors have some commands that support this format, and the 6502 is no exception.

BCD uses the fact that it is possible to store two decimal numbers in one byte since each figure is 0-9. A byte can be looked at as two nibbles (a nybble or nibble is four bits), and each decimal figure is stored in one of them. So, 29 in BCD would be 00101001 in binary, ie, a 2 in the top four bits, and a 9 in the bottom four.

There is a flag called the D or decimal flag on the 6502 which can be turned on or off with the SED and CLD commands respectively.

When the D flag is set, the microprocessor is in decimal mode, and any arithmetic functions (ADC and SBC) are performed taking into account that a nibble can only hold a maximum value of 9.

If the lower nibble becomes greater than 9 then the value is subtracted from 10 and the result stored in the low nibble, one is added to the higher nibble.

One thing to make sure of is to reset the D flag after decimal operations have ceased. If this is not done, confusion reigns when the program returns to the operating system, since it usually expects to be in binary mode.

To print decimal numbers on to the screen, the fact that the Ascii value of the digits start at 48 is used. The code for zero is 48, one is 49, nine is 57, and so on. Once you have performed the decimal arithmetic, the nibbles need to be split, and then have 48 added to them to get the correct Ascii code to enable them to be placed on to the screen.

VON KARAJAN ON YOUR ST?

Mark Jenkins reviews Super Conductor, an editing package that, while it won't make you into a great musician, will certainly make things easier

Musical applications were very much highlighted at the recent London Atari Show, thanks to the efforts of software importers Syndromic Music.

This week, however, we're taking a more detailed look at a package previewed before the show, the *Super Conductor* from Microdeal/Michtron. *Super Conductor* is relatively inexpensive at around £50. Yet it seems to have many advanced functions combined with a rather straightforward system of operation.

The basic display screen shows 16 channels displayed horizontally; the default settings make these correspond to the 16 channels available in Midi, but this can be changed afterwards if desired.

Music is recorded in real time from the synthesiser keyboard, but can be quantised to regular intervals afterwards. Once you've played a piece it will be stored in an edit buffer; you can then quantise, transpose or otherwise edit it before deciding where on the main display to place it.

Clicking on one particular track will bring up a display which asks what you want to call the new piece (unfortunately only six spaces are available to do this) and where you want to place it; the exact positioning is defined to the closest bar, beat and click, and you can type in the exact figure you want.

Once you click on OK, or press Return (all mouse functions being duplicated on the computer keyboard), a section of the track you've chosen turns dark and if the name you've chosen is short enough, the name will be displayed inside it. If the section isn't large enough, you can click on 'Sizing' at the bottom of the screen and completely re-define the scale of the display; of course, this is also helpful in checking that different sections do in fact join together neatly.

Stopping recording is simply a matter of hitting the space bar, so in the event that you went a little too far, you can simply chop the end off a piece. And this is where *Super Conductor* has advantages over Hybrid's *EZ-Track* and some other beginners' packages – it's now very simple to click on a section, move it to another track or to a later part of the same track, rename it if

desired, and copy it into the piece.

This means that you can achieve effects which are impossible using simpler packages – such as creating a steady, repetitive bassline, duplicating a chorus from the beginning of a track to the end, or creating modified versions of a section to represent variations in different parts of your tune without having to start from scratch.

If you're really into detailed editing, the Edit option will list out every single Midi

This simply means that an F# (Midi note number 65) started at the 2nd, bar, 1st beat, 34th click with a velocity of 64 and was released with a velocity of 64 at the second bar, third beat, 46th click. Pressure controller, program, channel pressure and pitch bend signals are all labelled as such in clear English.

What else can you do with *Super Conductor*? Well, it will act as a system exclusive recorder, which means you can store sounds from any synth or sampler capable of dumping them via Midi, editing the dump commands you need using a word processor package such as *First Word* if you're really keen.

You can also use the three built-in voices of the computer to play three of the channels of music, deciding what sounds they make either by sending patch change information from your synth or by typing command codes into the 'edit block' section. The internal sounds are pretty limited, but

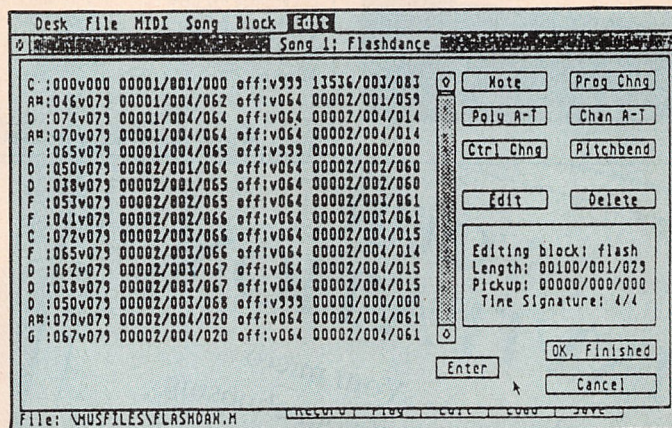
as Microdeal points out, they're free, so you may as well make use of them.

Overall impressions of *Super Conductor* must be that the package is very good value for money. It's the only inexpensive package on the market capable of controlling many Midi synths which has advanced block copying, quantisation and Midi data editing functions, and it's not too difficult to use.

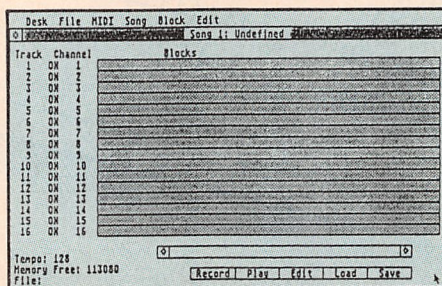
It is a little bit numerically-oriented – having to go to 'list blocks' to find the length of each block rather than having it displayed on the screen is a pain, as is some of the typing work involved in entering edit information – but for the price, those minor details deserve to be overlooked.

Microdeal/Michtron UK, PO Box 68, St Austell, Cornwall PL25 4YB, 0726 68020.

If you have any queries or tips for this column, please write to Mark Jenkins at *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP. Mark would also welcome examples of your own music on audio or program tape, or disc.



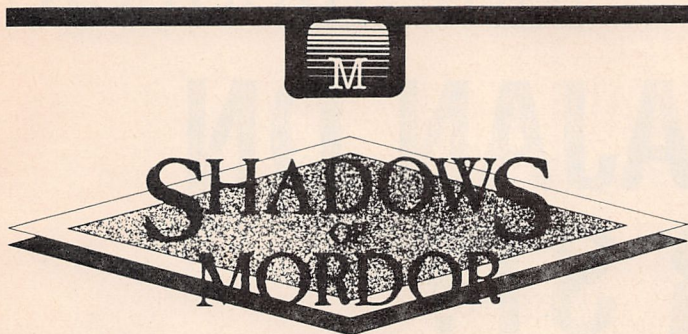
The editing screen: just click on your choice



The main screen: all mouse functions are duplicated on keyboard

event which goes to make up a block. This makes it possible to correct bad notes, change velocities for emphasis, enter patch changes or pitch bends, and so on. Of course, the package in normal recording mode will handle pitch bend, patch change, channel and key pressure and velocity as well as sustain pedal and controller information. A typical edit page listing might look like this:

F#:065 v64 00002/002/034 off:v064 00002/003/46



You've played The Hobbit ...
You've played Lord of the Rings ...

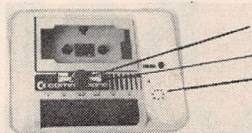
Now play Shadows of Mordor ...
Lord of the Rings Game 2

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Prestel introduces Keyword searching

David Wallin brings you a quick update on features on Prestel's Micronet 800, including the new keyword searching facility, and responds to some letters

Keyword searching has arrived on Prestel! This was one area where Prestel was far behind other view-data systems; for example, anyone who has used The Gnome or Prometheus – now sadly off-line – or any other public system will know that they can use the keyword sequence *BYE# to log off, rather than Prestel's previous *90#.

On this example, the advantage of keywords may not be obvious, but when searching for pages or sections, it is much simpler to use a word relating to the section than remember its page number – particularly when you want to look at a large number of pages.

It's also handy for trying to find pages when you're not sure if they exist at all! Say you wish to find out if Prestel covers TV programmes (it does), then, rather than hunting through menu and index pages, you can simply key in *TV#. If this didn't work (in this case, it does), you could try similar things: *TELEVISION#, *PROGRAMMES#, etc. But it's the speed and convenience of keyword searching that makes it such a welcome addition.

Messaging

To my mind Prestel's messaging system is not one of its strong points, particularly when compared to Microlink's, which is very powerful. Admittedly, there are graphics and colour available, but you are limited to a tiny screen size of about 15 lines of 35 characters – I often compile messages off-line on my Td2500, only to find that they are too long.

Especially annoying is the method of replying. Instead of simply typing in 'reply' after reading a message, followed by the reply text, you must first make a note of the mailbox number of the sender, then go to page *77# (send a mailbox), enter the number and send the message. Not nearly so neat.

Shades

Shades is Micronet's MUG (multi user game), and has been covered before in this column when it was first introduced. However, a recap and update now that it is well-established will not come amiss.

Shades is big. Up to 64 users can take part at any one time, divided into eight

users per game, and eight 'games' (or dreams) running simultaneously. Not surprisingly, I have never found *Shades* to be engaged.

Mapping the game is an enormous help, but as I said, *Shades* is big, and my own map is now seven pages long and nowhere near finished.

One of the best ways of getting on in *Shades* is to get other people to help you. Most characters are helpful, and won't mind lending a hand. Certainly, the first time I sent out a plea, I found myself being dragged around the land picking up treasure and points. Incidentally, my persona is Sensi, and I'm only too happy to meet up with playing readers.

Micronet sells *Shades* sweatshirts: white background, with 'Micronet Shades' written across it in blue. At £10, you would expect it to be of good quality, and thankfully I've found that it is.

Press 288

Press 288 is an area on Prestel which is great fun to use. It contains a number of quizzes with attractive prizes, with about a 2p-10p cost per frame. It can be accessed

from either *288# or *PRESS# (keyword!), and even if you are not a member of Micronet, can be viewed via modem.

If anyone wants to send a message to me on Micronet, my mailbox number is 819991214.

Table One: Some Prestel keywords

Service	Keyword	Page
Micromouse	MOUSE	800951
Shades	SHADES	8118
Micronet Menu	INDEX	800
Press 288	PRESS	288
Mailbox	MAILBOX	7
SEND	SEND	515
(special education needs database)		
Prestel Music	MUSIC	1307
Sport	SPORT	12
Betting	BETTING	125
Billing	BILL	33312
Advertisers	ADVERTISER	133
Computers	COMPUTERS	1014
Weather	WEATHER	115
TV and Radio	TV	1319
Amusements	FUN	138
Guidelines	HELP	3331
Passwords	PASSWORD	3331023



◀ continued from page 41

On to some news from other databases now, and Lee Nickeas telexed me details of another new bulletin board. He didn't give me too much information, presumably being cost-conscious on the telex. However, what details we have are that the number is 0602 706307, with both 1200/75 and 300/300 baud rates. I expect that the data protocol is 8N1, as with most boards, and it appears to be on for 24 hours a day.

It's a while since I defined data protocol, and it's probably about time I went over it again.

Basically, all standard characters (mainly numbers and letters of the alphabet) are given a numerical value, called its Ascii code (Ascii: American Standard Code for Information Interchange). For example, a space is Ascii code 32, A is 65, B is 98. In total there are 128 characters (numbered from 0-127) in the standard Ascii character set - there are variations with 256 characters.

For data transmission, the number is converted into binary to give numbers such as: A: 65: 1000001. A space, with the Ascii code 32, translates into 100000 in binary.

The binary ones and zeros are transmitted as tones. One is a high voltage (usually 5V) and a zero low voltage (less than 1.2V).

Depending on the speed in use, ones and zeros are given certain tones which are easily transmittable over the telephone line. One problem is that A takes up seven characters (bits) and the space only six.

In asynchronous communications (the type which home users are most likely to encounter) this is overcome by making each character a certain length. For example, if the length is 7, then 100000 would become 0100000, or if it was eight it would become 00100000.

This is known as word length, and is the first bit of the protocol. So 8N1 means a word length of eight bits and 7E1 means

seven bits.

The Ns and Es above refer to parity. This is a form of error checking, to enable the transmitter or receiver to see whether data has been corrupted while being sent. An extra bit, the 'parity bit' can be sent with the data.

There are three main types of parity (leaving aside Mark and Space, which you are not too likely to come across): Odd, Even and None.

Both transmitter and receiver should have their devices set to the same parity type. On the transmitting side, once the data has been entered, the parity bit is added, either a one or zero. If the data sent has an even number of ones within it, and the parity is set to 'even', the parity bit will

be a zero. If it is set to 'odd', the parity bit will be a one, to give, respectively, an even and odd number of ones in the data transmitted.

The receiving device, set to 'odd' or 'even' parity, will check that the number of ones transmitted correspond to the parity set. Thus, if set to 'odd', and an even number of ones are transmitted, it will throw up an error message.

No parity, or 'none', is where no parity bit is transmitted, and most bulletin boards operate this way.

Thus, in the 8N1 and 7E1 referred to above, no parity bit will be sent in the first instance, and your device should be set to 'even' parity, ie, to expect an even number of ones in the data received, in the second.

Most scrolling bulletin boards use 8N1 format, but viewdata systems use 7E1, and slowly, some bulletin boards are beginning to as well: Dubbs in Ireland, and Musictel 4, for example.

Interestingly, Telecom Gold is 7E1 format, although it is like scrolling bulletin boards in all other ways. PSS uses both 8N1 and 7E1. If a scrolling board used 7E1 as well, it normally that scrolling text will be shown to viewdata terminals - but graphics are not usually produced.

A new feature of some BBs (those running on FBBS) is to offer graphics to 8N1 users. This is called BBC Mode 7 colour graphics and means that BBC users can have colour and graphics if they have the right terminal software.

Musictel Plus is using this facility and providing an on-line 3D maze for people with BBC Mode 7 colour graphics and more on these lines is planned for the future.

BBC owners can check this ability if they have an *Advanced User Guide*, which has a listing of suitable software in it, by logging on to Musictel Plus (0843 590000) or Musictel HQ (01-455 0843).



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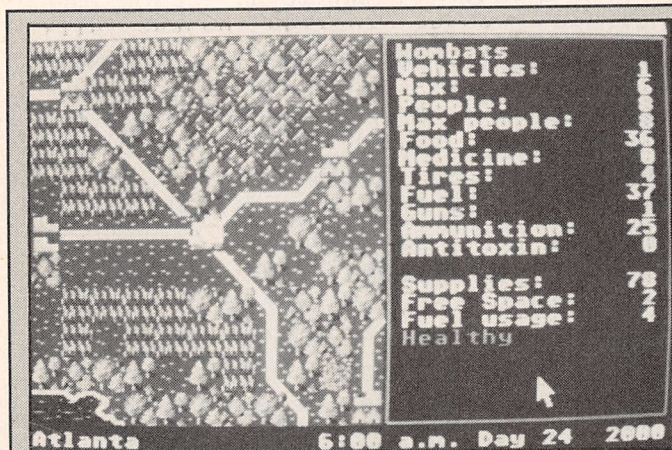
Your complete guide to all the software released this week

Amstrad CPC

Program *Parabola* **Type** Arcade
Price £1.99 **Supplier** Firebird Sil-

ver, 74 New Oxford Street, London WC1A 1PS.

Bouncing Bruce is stuck on the cosmic energy grid - well who said



There's no doubt that the *Mad Max* series of films (themselves owing quite a bit to books like Roger Zelazny's excellent *Damnation Alley*) inspired a whole load of fantasy wargames - but so far, not too many have made it onto the home computer format. Until *Roadwar 2000* that is.

Roadwar 2000, from SSI (via US Gold in the UK) is a game that, initially, puts you in control of a eight-strong band of renegades, with a single car - all set in a post disaster scenario situation covering the whole of the United States. And it's an interesting mix of strategic planning and tactical deviousness.

The strategy comes in planning how to stay alive. You need food and fuel, obviously - but guns, ammunition, medicine and tyres are also of help. These are gained by looting. But you only have a very limited carrying capacity with your single car - so maybe you ought to search for others. Like a bus or an articulated lorry for instance.

Having these means you can carry a lot of supplies... but with them included in your party, you used much more fuel per square moved.

It's worth recruiting more people to join your group too, as there's safety in numbers - but then the amount of food you need per day goes up.

Initially, it's a difficult balance to strike, but while I struggled for hours to stay alive for more than a few days, a more able playtester constructed a huge band in a matter of a single evening.

Tactics involve the actual fighting between groups. You are always given the option of a simple abstract combat, or a full tactical battle. Although the latter is much more time consuming - a scrap with 15 or so vehicles taking the best part of half an hour for instance.

So you get your gang to be well hard, and then you find you get a mission. You must rescue eight scientists scattered around the continent, thereby saving humanity, etc. I get the feeling that *Mad Max* would have blown the bearers of this missive away, but still, that is the quest on which the rest of the game hangs.

Bearing in mind that the play emphasis is very much cerebral rather than nerve-tingling action, *Roadwar 2000* is an above average release. Naturally, the graphics are great on the ST, but it's also available for the 64 and Apple, with the same game system. However, detailed though the tactical bits are, a *Mad Max* shooter this isn't. The definitive road battle arcade game has yet to be written.

John Cook

these things ever had to be playable? In any case, this is a weird one. More of a puzzle/arcade challenge, I thought it looked a bit like our old friend *Q-Bert*, but was informed by the *Popular* playtester that it played rather like *Bobby Bearing*. With such a pedigree, how can it go wrong?

Program *Jackle & Wide* **Type** Arcade **Price** £2.99 **Supplier** Bulldog, 8-10 Paul Street, London EC2.

Program *Howard the Duck* **Type** Arcade **Price** £9.99 (tape) £14.99 (disc) **Supplier** Activision, 23 Pond Street, Hampstead, London NW3.

Arcade game based on the movie, converted reasonably well to the CPC.

Program *Enduro Racer* **Type** Arcade **Price** £9.99 (tape) £14.99 (disc) **Supplier** Activision, 23 Pond Street, Hampstead, London NW3.

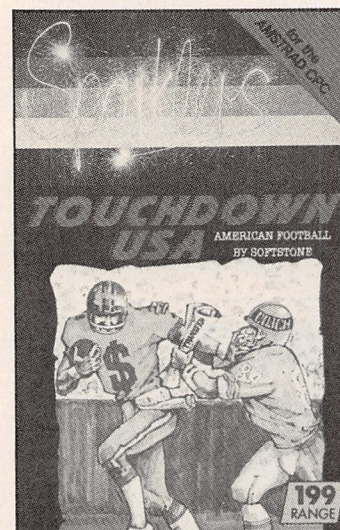
Sega coin-op conversion that was better on the Spectrum, but still OK on this format.

Program *Greyfell - The Legend of Norman* **Type** Arcade Adventure **Price** £9.95 **Supplier** Starlight, via Ariolasoft, Long Acre, Covent Garden, London WC2.

Program *Murder on the Atlantic* **Type** Adventure/Whodunnit **Price** £14.95 (tape), £19.95 (disc) **Supplier** Infogrames, Mitre House, Abbey Road, Enfield, Middx.

Another very well done computerised whodunnit from Infogrames. This one comes with piles of extra material that has to be studied closely for you to nab chummy.

Program *Touchdown USA* **Type** Strategy **Price** £1.99 **Supplier** Creative Sparks, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hampshire GU14 0NP.



Program *Express Raider* **Type** Arcade **Price** £9.99 (tape) £14.99 (disc) **Supplier** US Gold, Unit 2/3,

Holford Way, Holford, Birmingham B6 7AX.

Coin-op conversion from Data East wild west zapper.

Atari ST

Program *Roadwar* **Type** Strategy **Price** £24.95 **Supplier** US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.

Program *Colonial Conquest* **Type** Strategy **Price** £24.95 **Supplier** US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.

The only ST *Colonial Conquest* disc in the country arrived in the office at 9.16am last Tuesday. It was up and loaded by 9.17am.

Converted by Andromeda - the Hungarian based software house - it's very nicely done. Compared to the 64 version, as you would expect, the graphics and scrolling are a considerable improvement, and in addition, a couple of minor annoyances in the game system have been cleared up as well. Highly recommended, particularly as a multi-player strategy bash.

Program *Bureaucracy* **Type** Text Adventure **Price** £39.99 **Supplier** Infocom, via Activision, Pond Street, London NW3.

Douglas Adams returns after the mega-success of *Hitchhikers*, with one of the few adventures I ever felt compelled to spend more than five minutes with.

Love Adams or hate him, you have to admire the way his warped mind works.

Bureaucracy is all about one man's struggle against a system that appears to be suddenly conspiring against him.

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And more, and more... it soon gets like the most improbable of Whitehall activities. Simply wonderful.

Program *Film Director* **Type** Application **Price** £59.95 **Supplier** Mirrorsoft, Maxwell House, 74 Worship Street, London EC2.

Atari XL/XE

Program *Frenesis* **Type** Arcade **Price** £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

continued on page 50 ►

Here it is, the third entrant in the soon-to-be revered *Popular Hall of Fame* (known to the cognoscenti as the GTA – work that one out if you can) – *Hydrofool* from FTL.

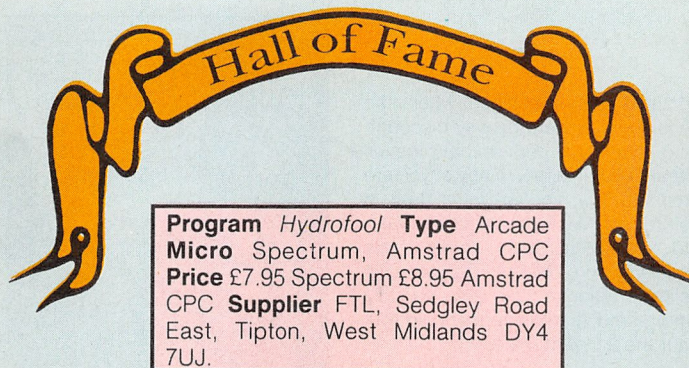
Not that this particular award is simply for the game... it's more of a recognition of a consistency of achievement from the forces behind FTL, namely Greg Follis and Royston Carter.

Ever since their first tentative toe in the piranha pond with *Ad Astra*, the Gargoyle/FTL output has been consistently wonderful, first coming to prominence with *Tir na Nog*. An animated adventure set in the Celtic netherworld, it stunned the public and sold like hot cakes over Christmas '84.

Follow-up *Dun Daroch* and puzzle-shooter *Marsport* established Gargoyle as technicians and punsters extraordinaire.

When FTL was established as the Gargoyle arcade arm, *Lightforce* showed that the Carter/Follis combination had forgotten nothing about playability since *Ad Astra*, but had learned enough to stretch the Spectrum to its limits. The very respectable *Shockway Rider* followed, and now comes *Hydrofool*.

Hydrofool carries on with the antics of Sweevo, the deeply strange robotic entity who surfaced in the game *Sweevo's*



Program *Hydrofool* **Type** Arcade
Micro Spectrum, Amstrad CPC
Price £7.95 Spectrum £8.95 Amstrad
CPC Supplier FTL, Sedgley Road
 East, Tipton, West Midlands DY4
 7UJ.

HYDRA FROLICS

World – a Gargoyle release which got the critical round of applause but never sold particularly well.

Sweevo, encased in a diving suit, now finds himself on the water world of Deathbowl, a planet that has been converted into a giant aquarium. And, as Barry Norman would say, why not?

The thing is that the aquarium now needs cleaning and must be drained. This involves emptying the water out, and how else would you empty a gigantic aquarium other than... pulling the plug out?

There are four plugs to be pulled in all – but their locations, how to release them and in what order to do so are the

very least of your problems as you swim around the 200 screens of the complex.

Being a robot, water makes you rusty... and when you get too rusty, you die. Just as well you have supplies of oil to keep yourself lubricated. You begin with the option of starting at one of four points – all named after classic Elvis tracks, natch – and you'll probably find at once that the indigenous population are not friendly.

Follis describes *Hydrofool* as an "explore and chase" game compared to an "access puzzle", like *Sweevo's World*.

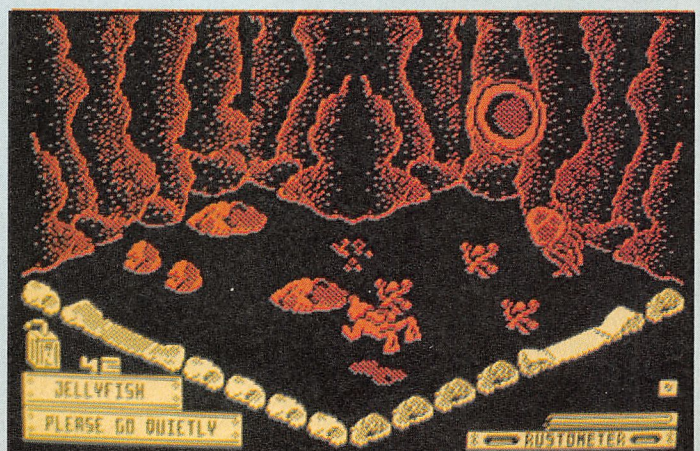
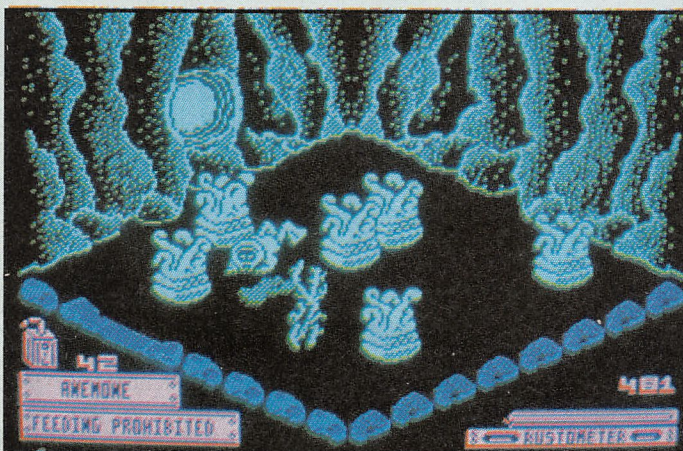
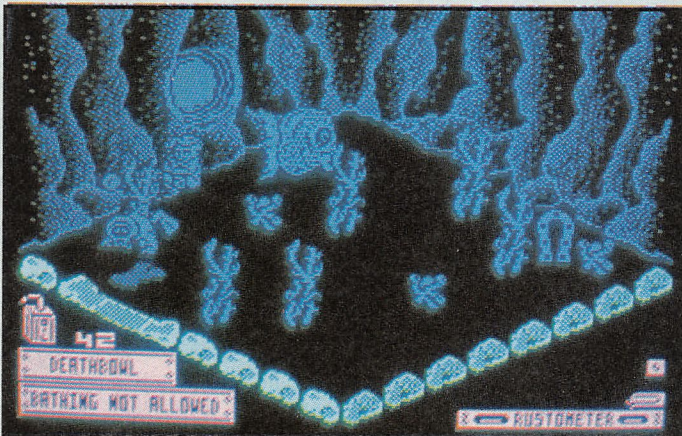
Both the design and implementation are excellent – the Rob Hubbard music on the 128 is an unexpected bonus – and the humor is as enjoyable groan-making as ever.

Another feather in the FTL cap, and a worthy member of the *Hall of Fame*.

Hints Box

- Of the four starting levels, level C is by far the easiest... try it to start with.
- Make a map – you'll not have a chance without one.
- When pulling the plugs out (we're not going to spoil the fun and tell you how) it's a good idea to think about the order in which you should do so.
- Kill, kill, maim... have no mercy on the inhabitants, who will search you out, then follow you about until you are very rusty. Different objects will kill different sorts of fauna... although the piranha cannot be zapped; only lured away.

Hydrofool from FTL: an "explore and chase" game compared to an "access puzzle", like *Sweevo's World*. Left: the Deathbowl planet. Below left: avoid the anemone. Right: the jellyfish.



NEW RELEASES

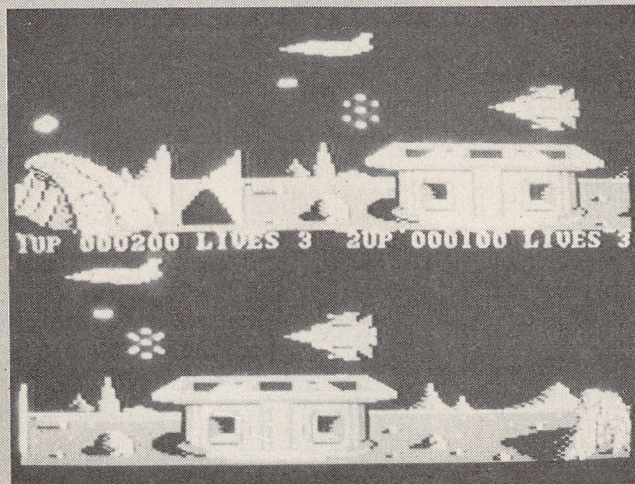
◀ continued from page 48

Alien zapping of the weirdest kind from that C16/Atari specialist Tony Takoushi.

Program *Attack of the Mutant Camels* **Type** Arcade **Price** £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

I suppose there must be a whole generation of Atari users who

bought their machines when the chain stores were heavily discounting recently – and so have never heard of Jeff Minter. If any of you are reading this, you've got a treat in store, as Mastertronic is planning to release more and more of his earlier works. *Mutant Camels* is a classic shooter, so any vaguely interested Atari owners should fork out the £1.99 at once.



Hewson has a problem in that most of its hits have been created by a single programming team, separate from the company – Grafgold, comprising of Steve Gurner and Andrew Braybrook.

This, no doubt, explains its present internal expansion, together with further acquisition of other titles from outside. *Eagles* is one of the latter, written by Danes Per Madsen and Bo Nielsen.

No matter how good it is, there are going to be immediate comparisons with Hewson's other 64 shooter output – mostly written by Braybrook. And there's no question that although *Eagles* falls safely into the "acceptable" bracket for full price software, it lacks his design originality and faultlessness of implementation.

The game itself is a respectable shooter, based in the far future, where we are fighting aliens over a futuristic scrolling landscape – using huge jet fighters.

The screen is split horizontally in half, allowing independent two-player action – probably the game's biggest asset and in itself a clever technical achievement.

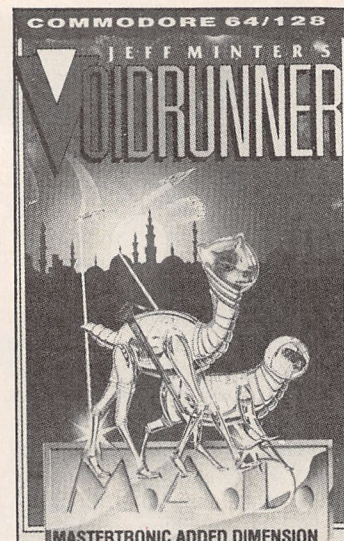
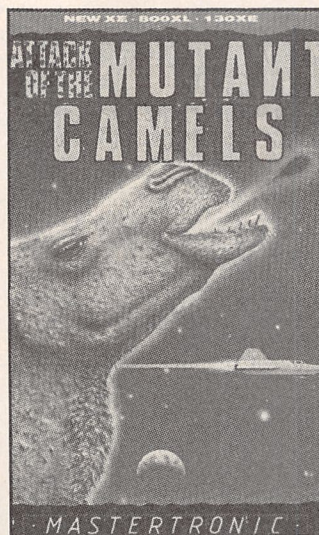
However, this in itself causes problems. The split screen cuts down the vertical space available to each player – compounded by the fact that the jets are massive in any case. Viz – there is very little room for manoeuvre. The aliens are tiny in comparison, something that the *Popular* games droids also found very annoying.

Playability isn't bad – particularly when playing head to head – as you zap the aliens and compete for picking up and dropping message droids that appear, for extra points and, on later screens, smart bombs. But even here though, we found a flaw – if you get blown up by a particular bouncy sort of alien, your next man reappears... and you get blown up again, and again...

By no means fatal, but the kind of thing that should have been picked up in playtesting.

To be fair, *Eagles* is OK and shows some promise in certain areas – but anyone expecting another Hewson 64 classic is going to be disappointed.

John Cook



BBC B

Program *Star Drifter* **Type** Arcade **Price** £1.99 **Supplier** Firebird, 74 New Oxford Street, London WC1A 1PS.

Bog standard arcade adventure that has you weebing around a deserted Colonisation liner.



Commodore 64

Program *Gerry the Germ* **Type** Arcade **Price** £1.99 **Supplier** Firebird, 74 New Oxford Street, London WC1.

Was part of the defunct Firebird Hot range – now out at £1.99... about as much as it was worth originally.

Program *Void Runner* **Type** Arcade **Price** £2.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

Minter *Centipede* variant now hits budget on the 64. Classic blasting.

Program *Tiger Mission* **Type** Arcade **Price** £9.95 (tape) £14.95 (disc) **Supplier** Status Software, via Creative Sparks, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hampshire GU11 0NP.

Tiger Mission was programmed by a company called Kele Line (Swedish, I think) and it's terrible. A vertical scroller with nothing to recommend it. Do yourself a favour – don't do it.

Program *Enclave* **Type** Arcade **Price** £1.99 **Supplier** Creative Sparks, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hampshire GU11 0NP.

Program *The Great Burger Riot* **Type** Arcade **Price** £1.99 **Supplier** Creative Sparks, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hampshire GU11 0NP.

Program *Zenith* **Type** Arcade **Price** £2.99 **Supplier** Creative Sparks, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hampshire GU11 0NP.

Program *Advanced OCP Art Studio* **Type** Application **Price** £24.95 **Supplier** Rainbird Software, 74 New Oxford Street, London WC1A 1PS.

MSX

Program *Jackie & Wide* **Type** Arcade **Price** £2.99 **Supplier** Bulldog, 8-10 Paul Street, London EC2.

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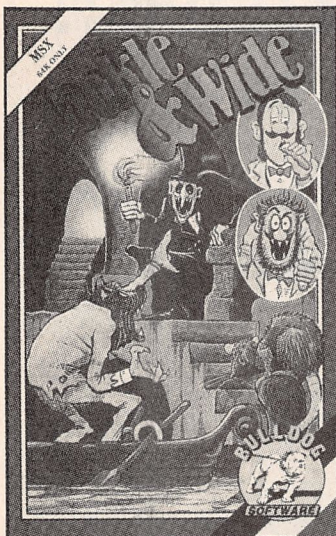
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NEW RELEASES

◀ continued from page 50



Type Graphic Adventure **Price** £24.95 **Supplier** Infogrames, Mitre House, Abbey Road, Enfield, Middx.

Innovative adventure set around the time of the French Revolution.

No text to type in, it's all done by mouse, and clicking on various options. Looks interesting.

Spectrum

Program Express Raider **Type** Arcade **Price** £9.99 **Supplier** US Gold, Units 2/3, Holford Way, Holford, Birmingham B6.

See Amstrad CPC listing for comment.

Program I, Ball **Type** Arcade Adventure **Price** £1.99 **Supplier** Firebird Silver, 74 New Oxford Street, London WC1.

PC and Compatibles

Program Passengers on the Wind

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| 7 | (16) | Konami's Coin-op Hits |
| 8 | (-) | Arkanoid |
| 9 | (6) | Gauntlet |
| 10 | (11) | Five Star Games 2 |
| 11 | (-) | I Ball |
| 12 | (13) | Big Four |
| 13 | (12) | Deeper Dungeons |
| 14 | (15) | 180 |
| 15 | (17) | Into the Eagle's Nest |
| 16 | (18) | Enduro Racer |
| 17 | (14) | Paperboy |
| 18 | (19) | Curse of Sherwood |
| 19 | (9) | Ollie and Lisa |
| 20 | (-) | Mini Office 2 |

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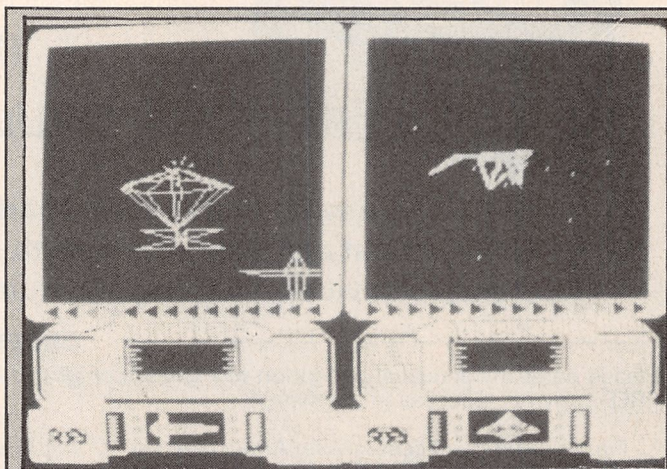
All figures compiled by Gallup/Microscope

Some budget games are good, some are bad, a few are great, I, Ball falls into the great category.

It's a vertical scroller, where you zap baddies and pick up extra

weapons.

Nothing new, of course, but the graphics are nicely designed and the frills include some digitised speech. Well worth the money.



The Popular charabanc stopped at the moderately trendy Rock Garden, adjoining Covent Garden market last Friday, for the official launch of Starlight Software. And this time, it seems, Francis Lee (ex-Beyond) is doing it right, together with a programming team that seems to consist largely of ex-Incentive people.

Products were there, ready to be handed out to the press (something Rainbird couldn't achieve with *Guild of Thieves*, later in the week) and the general mood was buoyant and optimistic – even though they did run out of lager twice.

The first offering, *Greyfell*, was a very reasonable 3-D perspective arcade adventure, featuring Norman the Cat as the main character. But here we're taking a closer look at *Dogfight 2187* on the Spectrum.

It first reminded me of *Starion* – technically the best of its kind on the Speccy – in that it is a wireframe graphic space shooter (more than one colour involved mind you) with a hook.

Hooks are needed on full-price games to justify the dosh you happen to be handing over for the privilege of playing it. Hooks are sometimes superfluous. Hooks often get in the way of the blasting (who needs a reason for all this violence anyway; whatever happened to the mystique of senseless carnage?) But most of all, hooks are always silly.

It's the year 2187. Scientists (well, actually, they were probably astronomers, but some people in white coats, anyway) have discovered a hole in the space time continuum, just off Alpha Centuri. Planets and stuff are leaking in from another universe, and what have the authorities done? Nothing that's what. So it's Rhett Dexter (as it's a multilingual instruction book, it has to be a Euro-silly name) to the rescue, prompted by legends handed down by the Old Ones.

The Old Ones? Well look at it this way, Rik Mayall will be around 235 in 2187.

Zap the aliens to get the bits of generator. Drop the bits of generator near the hole . . . when you've got enough bits (nine) the universe is saved.

That's the essence of the thing . . . except to say that the screen has been split horizontally to allow simultaneous two player action.

It's pretty good on Spectrum, if you're into that sort of game – although the price of the split screens is animation not quite as fast or smooth as *Starion* . . . or is that just nostalgia creeping in? We'll look forward to the Commodore version – always the acid test for wireframe graphics.

John Cook

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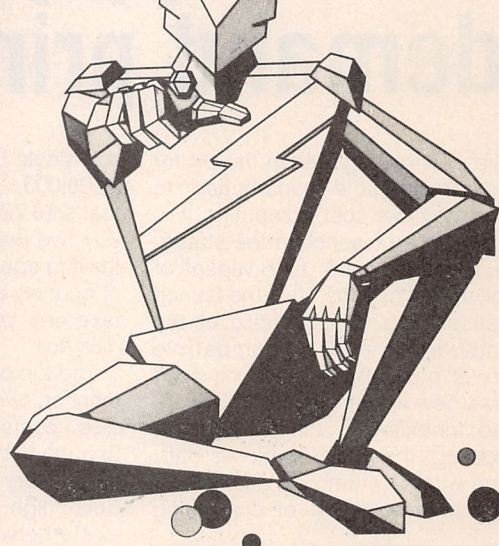
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In Poland, for example, it is hardly possible to pick up the major national daily newspapers without stumbling across invitations from a new breed of computing

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enterprise to sample the IBM PC, the Amstrad PC as well as a wide range of peripherals and other equipment.

In the Baltic coastal town of Sopot the "Infoservice" information technology co-operative offers customers the Amstrad word processor and PC, Star printers and floppy discs. In Warsaw, "Microvex", supplies IBM computers, the ubiquitous Amstrads, and advertises the fact that it is the only authorised representative in the country of Citizen, Maxell and Nashua products. Another Warsaw firm, "Numerica", specialises in IBM clones and in particular the Brentwood Amstrad.

IBM compatibility does not come cheap in Poland. The bottom of the range model supplied by Numerica with a mono monitor

and single floppy disc drive costs a cool Zl 2,095,000. At the official exchange rate that's \$8,729. For the same outlay you can buy two brand new FSO 1500 saloon cars (having spent several months in the queue of course) and have enough money left to take one year's leave from the tedium of daily toil.

The top of the range Amstrad with colour monitor, twin floppy drives and 20MB hard disc, costs an astronomic Zl 5,803,000. Enough to buy a whole fleet of what passes for a luxury vehicle in Poland, the Polonez. Such high prices measure the gap that exists between East and West in information technology. Here many individuals might consider a private purchase of even the most expensive Amstrad model, while in the East only corporate customers are in the market.

That market is vast and untapped. But Polish firms have one major problem - shortage of hard currency. If, through lack of greenbacks, they cannot buy Amstrad direct from Brentwood or Amstrad's agent in London, Polanglia Ltd, then they must buy locally at stratospheric prices. True, Polish firms tend to be flush with cash, zloties that seep into ever higher wages, and then into higher prices, much to the government's annoyance. No doubt the authorities would much rather see that money flowing into computer purchases than ever larger wages. Meanwhile the canny investor looking for lucrative opportunities in the soon to be reformed again Polish economy need look no further than the superprofits of the IT firms. There is only one snag: you have to take your loot in sacks of zloties - perhaps the most unattractive currency in contemporary Europe.

George Blazysca

Puzzle No. 257

You may remember that Jamie recently carried out some investigations on 'nearly equilateral' triangles. Since then he has turned his attention to 'nearly' squares.

A 'nearly' square is one in which the length and the breadth are an exact number of inches, but the two dimensions differ by just one inch. So a 7 inch by 8 inch rectangle is a 'nearly' square.

Jamie has just discovered two different sized 'nearly' squares which have the same area as a single larger 'nearly' square. Of course, all principal dimensions are an exact number of inches in length, and the area of the largest 'nearly' square is an exact number of square feet.

Can you find these sizes, which should be the smallest possible?

Solution to Puzzle 252

The values are: $594 \times 27 = 16038$. By substituting a 6 and a 7 for the 2, the other answers are: $927 \times 63 = 58401$ and $345 \times 78 = 26910$.

The program listed first requires the value of the known digit to be input. Using this information it then uses a series of FOR/NEXT loops to generate the other four digits in the two numbers to be multiplied together. As each digit is generated it is tested to check that it is different from the other digits and the known digit. As each set of possible digits is found the product of the sum is computed.

Winner of Puzzle 252

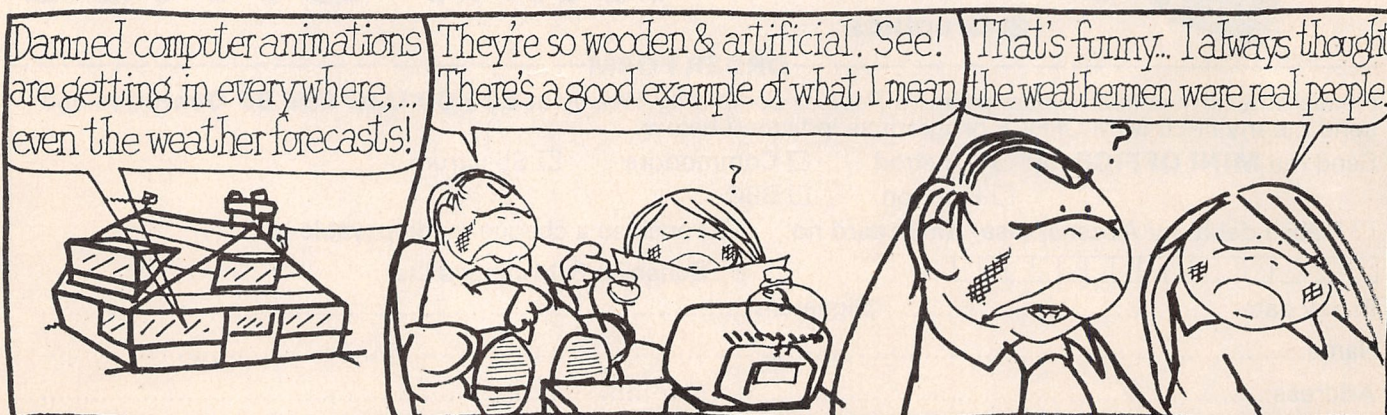
This week's winner is Daniel Stump, of Edinburgh, who will receive £10.

Rules

The closing date for Puzzle 257 is June 3. Answers should include a program listing if possible.

```
10 REM Generate Variables
20 INPUT "Input Known Digit";X:PRINT "Known Digit:";X
30 FOR A=1 TO 9:IF A=X THEN 290
40 FOR B=0 TO 9:IF B=X THEN 280
50 IF A=B THEN 280
60 FOR C=0 TO 9:IF C=X THEN 270
70 IF C=A OR C=B THEN 270
80 FOR D=0 TO 9:IF D=X THEN 260
90 IF D=A OR D=B OR D=C THEN 260
100 REM Compute Product
110 PRODUCT=(A*100+B*10+C)*(X*10+D)
120 IF PRODUCT=10234 THEN 260
130 REM Check for Duplication of Digits
140 PROD$=STR$(PRODUCT)
150 FL=0:FOR F=1 TO 5
160 N=VAL(MID$(PROD$,F,1))
170 IF N=A OR N=B OR N=C OR N=D OR N=X THEN FL=1
180 NEXT F
190 IF FL=1 THEN 260
200 FOR F=1 TO 4:FOR G=F+1 TO 5
210 IF MID$(PROD$,F,1)=MID$(PROD$,G,1) THEN FL=1
220 NEXT G
230 IF FL=1 THEN 260
240 REM Print Solution
250 PRINT A;B;C;"*";X;D;"=";PROD$
260 NEXT D
270 NEXT C
280 NEXT B
290 NEXT A
300 GOTO 10
```

HACKERS





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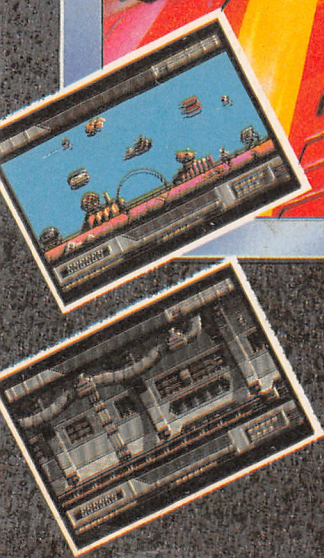
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